

Revision of the recent Australian Turridae referred to the Genera *Splendrillia* and *Austrodrillia*

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ABSTRACT

Turrids previously referred to the genera *Splendrillia* and *Austrodrillia* from southern Australian waters are revised; two tropical representatives are included. Sixteen species are recognized in *Splendrillia* and five in *Austrodrillia*. *Clavus candidulus* Hedley, 1922 is transferred to *Splendrillia*. Five new species of *Splendrillia* are described, three from southern Western Australia and two from Queensland. In *Splendrillia*, *S. molleri* Laseron, 1954 is synonymized with *S. woodsi* (Beddome, 1883) and *S. harpularia* (Desmoulins, 1842) and *S. duplaris* Hedley, 1922 are provisionally transferred to the genus *Crassispira* in the subfamily Crassispirinae, and a new species is described in this genus. Based on an examination of the radula of the type species, *Austrodrillia angasi* (Crosse, 1863), the genus *Austrodrillia* is also transferred to the Crassispirinae. In *Austrodrillia*, *A. achatina* (Verco, 1909) is synonymized with *A. dimidiata* (Sowerby, 1896).

INTRODUCTION

The neogastropod family Turridae is the largest of all the molluscan families (Abbott and Dance, 1982). Kilburn (1983) estimated that there are over 2,000 Recent species, but now considers there to be over 4,000 species (Kilburn, pers. comm.). Turrids occur in most benthic marine habitats, from the intertidal to the deeper parts of the ocean, and from tropical to polar habitats. They are generally more common in deeper water than in the intertidal zone. Over 50% of the predatory gastropods of abyssal bottoms are turrids (Taylor, Morris and Taylor, 1980). In contrast to the taxonomic diversity of the family, many species of turrids have low population densities and are represented in museum collections by only a few specimens.

Turrids are combined with the families Conidae, Terebridae and Thatcheriidae (which has only a single Recent species) in the superfamily Conoidea on the basis of having a toxoglossan radula which is highly modified to inject poison from specialized salivary glands into prey (Bouchet and Warén, 1980). The toxoglossan radula is considered to be derived from the taenioglossan type. In its most primitive form, seen in some Clavinae, the radula has five teeth per row (a central tooth

flanked on each side by a lateral and a marginal). Only the marginal teeth are present in the most advanced turrid radulae. In specialized turrid radulae the teeth are dagger shaped and are used singly, much as they are in cones. The full range of toxoglossan radular variation is exhibited in the Turridae (Shimek and Kohn, 1981).

Subfamilial classification in the Turridae has been controversial and there is as yet no agreed classification. Powell (1966) devised a scheme which recognized nine subfamilies based primarily on shell characters. McLean (1971) incorporated an analysis of radular types to expand the classification into 15 subfamilies. An alternate view was taken by Bouchet and Warén (1980), who considered the proposed subfamilial classifications to be based on a "more or less random" grouping of species by shell characters. They avoided the use of subfamilies altogether. In a major series of papers Kilburn (1983; 1985; 1986; 1988) contended that any practical subdivision was better than none. His regional revisions of the turrids of southern Africa used a subfamily classification based on the proposals of Powell (1966) and McLean (1971).

The present paper is the first in a series intended to revise the Australian Recent Turridae. A brief literature survey (Wells, unpubl. data) has established that over 500 names for specific or subspecific taxa have been used for Australian turrids. Clearly there are too many taxa to be examined at a single time, so the pragmatic subfamily approach used by Kilburn (1983; 1985; 1986; 1988) is adopted here. The classification followed is that of Powell (1966) as modified by McLean (1971) and Kilburn (1983; 1985; 1986; 1988). The basis for generic assignments in the Turridae is as uncertain as classifications at the subfamilial levels (Bouchet and Warén, 1980). The present work attempts to revise Australian taxa at the species level; with few exceptions existing generic assignments are retained.

The only complete revision of Australian turrids is that of Hedley (1922), in which approximately 370 species were discussed. The primary treatments of Australian turrids since Hedley have been those of Laseron (1954), who revised the Turridae of New South Wales, and Powell's (1964; 1967; 1969) revision of Indo-Pacific Turrinae and Turriculinae. A number of Recent turrids were found for the first time in Australian waters on cruises of the MV 'Soela' on the North West Shelf and slope off the north coast of Western Australia in the early 1980's. Turrid specimens collected on the cruises were sent to Dr. S. Kosuge in Japan and are being reported elsewhere (Kosuge, 1985; 1986; 1988a; 1988b). The major works on fossil Australian turrids are those of Powell (1944), Cotton (1947) and Long (1981). These papers recorded six species of *Splendrillia* in the Australian fossil record. Only one of these, *S. harpularia*, is extant.

The present paper revises the Recent temperate Australian species of the genera *Splendrillia* and *Austrodrillia*, which have been consistently been referred to the subfamily Drilliinae; in Australian waters, both genera occur primarily in southern temperate regions. The subfamily is better known as the Clavinae Casey, 1904, but this is a homonym of the hydrozoan Clavinae McCrady, 1859, and Drilliinae Morrison, 1966 should be used (Cernohorsky, 1985). Kilburn (1988) and Vaught (1989) followed Cernohorsky's recommendation, but Sysoev and Kantor (1989) did not; the question is still not resolved.

Very little is known of the biology of the Drilliinae. Maes (1983) presented limited information on reproductive and digestive morphology of *Drillia cydia* (Bartsch). Sysoev and Kantor (1989) described *Splendrillia chathamensis* and

included a number of aspects of the anatomy of preserved animals. Kilburn (1988) pointed out that some genera are known only from shell characters, and most of the Australian species are known only from dead collected shells. Because of this the assignment of species to genera and the relationships of the genera are tentative and may be changed considerably if preserved material becomes available for examination.

METHODS

Type material has been obtained wherever possible from the museum in which it is deposited. Most of the material examined is at the Australian Museum, Sydney. A secondary source has been the Western Australian Museum, Perth. The collections of the Queensland Museum, Museum of Victoria and South Australian Museum have also been briefly examined. Descriptions are based on shells oriented in the traditional way, spire up, with the aperture facing the viewer.

The following abbreviations are used:

AM,	Australian Museum, Sydney
BM(NH),	British Museum, Natural History, London
MNHN,	Museum National de Histoire Naturelle, Paris
MV,	Museum of Victoria, Melbourne
NMNZ,	National Museum of New Zealand, Wellington
QM,	Queensland Museum, Brisbane
SAM,	South Australian Museum, Adelaide
TM,	Tasmanian Museum, Hobart
WAM,	Western Australian Museum, Perth
ZMA,	Zoological Museum, Amsterdam
l,	shell length
w,	shell width
a,	length of aperture

TAXONOMY

Subfamily Drilliinae Morrison, 1966

Drilliinae: Morrison, 1966: 1-2. Cernohorsky, 1985: 60-62. Kilburn, 1988: 172-227.

Clavinae: Casey, 1904: 123-170. Powell, 1942: 84-120. Cotton, 1947: 1-12. Laseron, 1954: 16-20. Cotton, 1959: 392-393. Macpherson and Gabriel, 1962: 232. Iredale and McMichael, 1962: 77-78. Powell, 1966: 70-95. McLean, 1971: 116-117. Powell, 1979: 230-235. Long, 1981: 37-41. Sysoev and Kantor, 1989: 205-214.

Diagnosis

Shells small to medium, 6-30 mm, high spired, medium to solid weight, anterior end often truncated. Protoconch paucispiral, smooth, rounded, 2-4 whorls. Up to 8 teleoconch whorls with variable sculpturing, usually strong axial ribs, and/or lighter spiral striae. Sinus on shoulder slope moderate to deep, callused. Outer lip thin to thickened, usually lacking varix. Stromboid notch usually present. Anterior canal truncated, broad, often slightly notched. Operculum present in species where animal is known; oblongate, nucleus terminal. Radula prototypic; comb-like central tooth flanked on each side by one lateral and one marginal.

Genus *Splendrillia* Hedley, 1922

Splendrillia Hedley, 1922: 250. Type: (o.d.): *Drillia woodsi* Beddome, 1883. Powell, 1942: 99-104. Cotton, 1947: 11. Laseron, 1954: 16-17. Cotton, 1959: 393. Macpherson and Gabriel, 1962: 232. Iredale and McMichael, 1962: 77. Powell, 1966: 83-84. Powell, 1979: 232-234. Kilburn, 1988: 206-218. Sysoev and Kantor, 1989: 205-214.

Diagnosis

Shells small to medium, 8-30 mm, light to solid, high spired, truncated anterior end. Protoconch paucispiral, 2 whorls, smooth, rounded to globose. Up to 9 teleoconch whorls with strong axial ribs, spiral sculpturing absent or restricted to anterior of shell. Pronounced subsutural fold in many species. Sinus moderate to deep, outer lip thin to thickened, stromboid notch slight. Anterior canal short, broad, shallow to strongly notched. Shell white to brown. Operculum oblongate, nucleus terminal. Indo-Pacific and southeastern Australia; intertidal to 370 m.

Remarks

Hedley originally proposed *Splendrillia* as a subgenus of *Melatoma* but Powell considered the status of *Melatoma* to be uncertain and equated it with *Clionella*. Powell (1942) used *Splendrillia* at the generic level. This practice has been followed by most subsequent authors, though Kay (1979) regarded *Splendrillia* as a subgenus of *Clavus* and Kuroda, Habe and Oyama (1971) placed it as a subgenus of *Elaeocyma*.

Powell (1942; 1966) characterized the genus by the presence of a strong subsutural fold, but noted that it is reduced or absent in some species. Kilburn (1988) considered this to be incorrect as the type species, *S. woodsi*, lacks a subsutural fold. He also suggested that the genus may be polyphyletic because Powell (1966) had demonstrated quite variable radular types in the genus. The southern Australian representatives of *Splendrillia* revised here do appear to be polyphyletic. However with several hundred generic names available in the Turridae, transfer of species out of *Splendrillia* is better left until a more complete understanding of the Australian species of the family is developed. An exception has been made for *S. harpularia* for which a radula has been examined for the first time and is clearly not drilliine; the conchologically similar *S. duplaris* is also removed from the Drilliinae and placed in the Crassispirinae.

McLean (1971) followed Morrison (1966) in restricting the Drilliinae (as Clavinae) to include all species with rachiglossate, comblike lateral teeth. This type of dentition is clearly present in *Splendrillia woodsi*, the type species of the genus, and the position of the genus in the Drilliinae is confirmed.

Splendrillia woodsi (Beddome, 1883)

Plate 1, Figs. 1,6. Plate 2, Figs. 1-8.

Drillia woodsi Beddome, 1883: 167. Tate and May, 1901: 368. Hedley, 1903: 388. Verco, 1909: 301.

Drillia howitti Pritchard and Gatliff, 1899: 101, 172, pl. 8, fig. 2. Hedley, 1901: 722.

Austrodrillia woodsi (Beddome). Hedley, 1918: M81.

Melatoma woodsi (Beddome). Hedley, 1922: 253.

Splendrillia woodsi (Beddome). Cotton, 1947: 11. Laseron, 1954: 16, pl. 3, figs. 61, 62, 63. Cotton, 1959: 393. Iredale and McMichael, 1962: 77. Macpherson and Gabriel, 1962: 232.

Antimelatoma agasma Cotton, 1947: 14, plus unnumbered plate fig.

Splendrillia molleri Laseron, 1954: 17, pl. 4, fig. 71. Iredale and McMichael, 1962: 77. Powell, 1966: 83.

Shell

Shell small, solid, 17 mm, spire high. Protoconch of 2 globose, smooth whorls, 0.87 mm high, 0.87 mm wide; teleoconch up to 7 whorls. Upper parts of whorl smooth but no channel formed; about 18 strong but short ribs/whorl almost form nodules, and only go halfway down whorl on spire. Short ribs also on body whorl, below which strong growth lines are only sculpture. Columella smooth, broad, heavily calcified. Aperture suboval, siphonal canal short, very broad. Deep U shaped sinus with prominent callus at entrance. Outer lip thickened. Shell a glossy brown in fresh specimens, aperture lighter. The brown fades to a light grey after death.

Measurements:

	Length (mm)	Width (mm)	Aperture (mm)	W/L	A/L
Holotype (<i>woodsi</i>)	12.8	4.8	5.2	0.38	0.41
Holotype (<i>howitti</i>)	13.5	4.8	4.8	0.36	0.36
Holotype (<i>agasma</i>)	18.5	6.4	7.3	0.35	0.39
Holotype (<i>molleri</i>)	14.3	5.2	5.8	0.36	0.41
Mean (n=15)	15.2	5.6	5.6	0.37	0.37
S. D.	1.3	0.4	0.5	0.02	0.03
Range	13.0- 16.7	4.8- 6.3	4.7- 6.5	0.34- 0.40	0.33- 0.42

Radula

Central tooth flanked on each side by single lateral and single marginal teeth (Plate 1, Fig. 1). Central tooth with indistinct base plate which is 73 μm long and 33 μm wide. Centre of tooth with a single long (22 μm), thin (4 μm) cusp, pointed in the last 4 μm . Lateral teeth broad, 121 μm wide, and 59 μm high. Most of the tooth dark on SEM photos, but upper margin a glossy white with 10 long, thin, slightly curved, pointed cusps. Innermost cusp small. Cusp size increases to 22 μm high and 9 μm across the base on the central cusps before decreasing on the outer cusps. Lateral cusp triangular, 55 μm across the base and 20 μm high, and pointed towards the centre of the tooth. Lateral teeth long (290 μm), straight and flat, with a broad (60 μm) base plate which narrows in the centre 20 μm before broadening to 50 μm then coming to a point.

Operculum

Operculum (Plate 1, Fig. 6) horny, brown, oblongate, slightly curved, with a rounded terminal nucleus, 3.1 mm long and 1.5 mm wide. Numerous growth lines present.

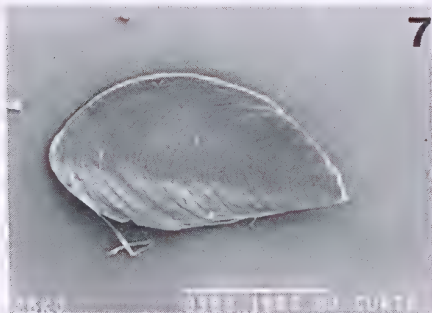
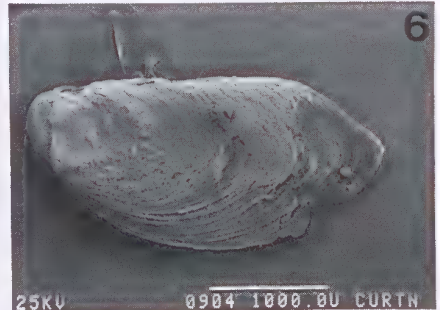
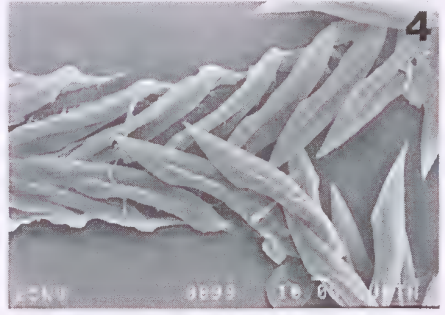
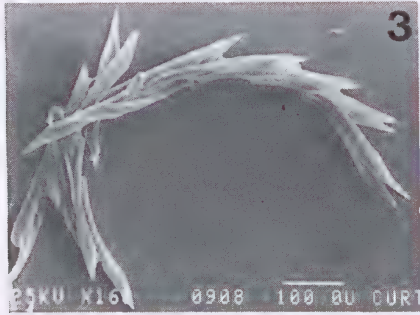
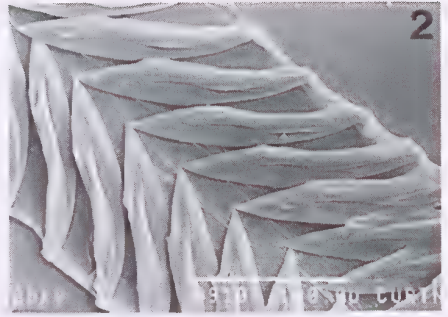
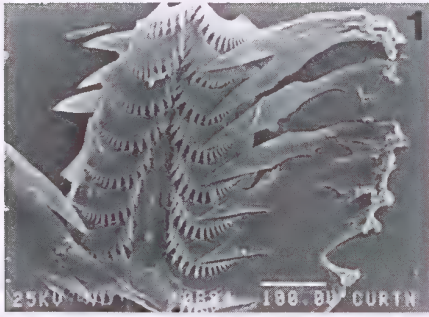


Plate 1. Radulae. Fig. 1. *Splendrillia woodsi*. Fig. 2. "*Crassispira*" *harpularia*. Fig. 3. "*Crassispira*" *ansonae*. Fig. 4. *Austrodrillia angasi*. Fig. 5. *Austrodrillia beraudiana*. Operculae. Fig. 6. *Splendrillia woodsi*. Fig. 7. *Austrodrillia angasi*.

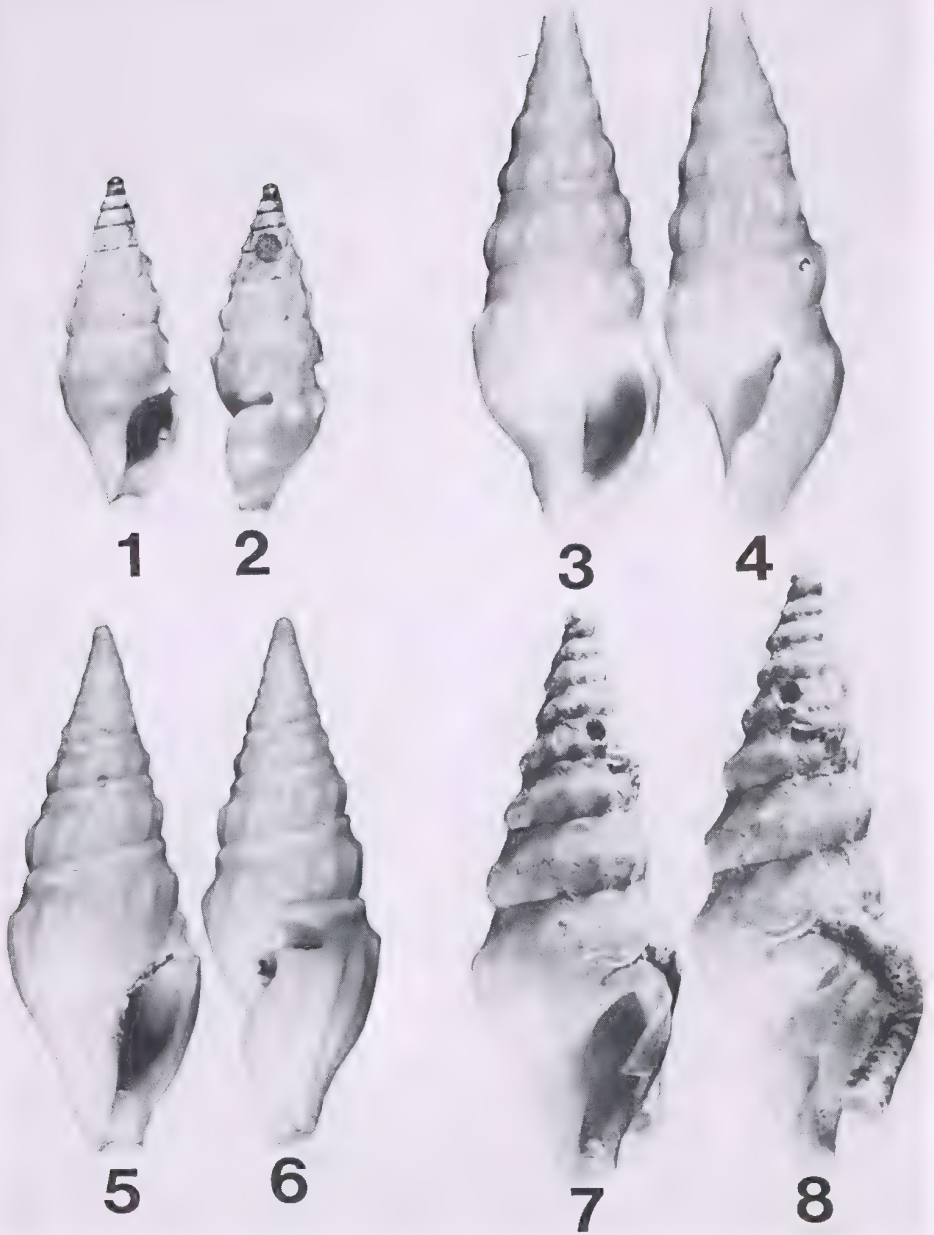


Plate 2. *Splendrillia woodsii*. Figs. 1,2. *Drillia woodsii* Beddome, 1883. Holotype, BM(NH) 1900.8.14.156. Figs. 3,4. *Drillia howitti* Pritchard and Gatliff, 1899. Holotype, MV F.573. Figs. 5,6. *Antimelatoma agasma* Cotton, 1947. Holotype, SAM D.14209. Figs. 7,8. *Splendrillia molleri* Laseron, 1954. Holotype, AM C.103386.

Location of types

(*woodsii*): Holotype. BM(NH) 1900.8.14.156. (*howitti*): Holotype. MV F.573. (*agasma*): Holotype. SAM D.14209. (*molleri*): Holotype. AM C.103386.

Type localities

(*woodsii*): D'Entrecasteaux Channel, Tas. (*howitti*): Gippsland Coast, Victoria (Laserson, 1954). (*agasma*): 183 m off Beachport, SA. (*molleri*): 91 m off Crowdy Heads, NSW.

Material examined

Types.

QLD: 63 m off Wide Bay (AM); 109-178 m E of Caloundra (AM).

NSW: Black Rock, Richmond River (AM); 23-37m, 8 km E Woody Head (AM); Clarence River (2 AM); Woolgoolga off Tathra (AM); 56 m N of Coffs Harbour (AM); 82-101 m, 18km NW of Crowdy Head (2 AM); 40 km off Manning River, near Taree (AM); 73-91 m off Manning River (AM); 86 m off Taree (AM); 72-82 m Cape Hawley, near Forster (AM); Broughton I. (AM); Port Stephens (AM); 45-73 m off Port Stephens (AM); 73-82 m off Port Stephens (AM); 457-467 m E of Cape Three Points (AM); Cabbage Tree I. (AM); off Sydney: Port Jackson (MV); 66 m, 1.6 km E of Malabar (15 AM); 66 m, 2.3 km E of Malabar (19 AM); 192-203 m, 29 km E of Malabar (AM); 58 m, 2.6 km E of Maroubra Beach (AM); 66 m, 2 km E of Long Bay (20 AM); 76 m, 5.5 km E of Long Bay (AM); 86 m, 10 km E of Long Bay (AM); 119 m, 14.5 km E of Long Bay (3 AM); 60-66 m, 4.2 km E of N Head (AM); 66 m, 5.6 km E of N Head (3 AM); 2.6 km E of Cape Banks (2 AM); 82 m, 4.5 km off Cape Banks (10 AM); 110 m, 14 km E of Cape Banks (20 AM); 71-77 m, 5.7 km E of Minstral Bank (AM); 64 m Crookhaven (AM); 36-55 m off Sydney (AM); 75-150 m E of Sydney (AM); 295 m E of Sydney (AM); 384 m off Sydney (AM); 393 m off Sydney (AM); 457 m, E of Sydney (3 AM); 457-549 m, 44 km E of Sydney (AM); 549 m E of Sydney (3 AM); 896-924 m E of Sydney (2 AM); 1106-1143 m E of Sydney (2 AM); 1463 m, 56 km E of Sydney (AM); Middle Harbour, Sydney (AM); 60-101 m off Botany Heads (3 AM); 457 m off Botany Bay (2 AM); 366 m off Botany Bay (AM); Sow & Pigs Reef, Sydney (AM); Cronulla (AM; MV); 10 m off Cronulla (AM); 70-90 m off Cronulla (6 AM; 2 WAM); 153 m off Cronulla (AM); 281 m E of Wollongong (AM); 85m off Jibbon (AM); 60-100 m off Jibbon (5 AM); 46 m off Port Hacking (AM); 82 m off Port Hacking (AM); 281 m off Port Kembla (AM); 741 m off Port Kembla (AM); 119 m Jervis Bay (AM); Montagu I. 110-128 m, 8 km N Montague I. (AM); 91 m, 11 km N Montague I. (AM); 146-164 m, 38 km NNE Montague I. (AM); 101-119 m, 8-16 km S Montague I. (AM); 119 m, 100 km S Montague I. (AM); Eden (3 AM); 18 m Eden (AM); 274 m E of Eden (AM); 91-274 m S Eden (AM); Twofold Bay (2 AM; 2 MV); 15-46 m Twofold Bay (AM); 27-129 m Twofold Bay (AM); 37 m off Twofold Bay (AM); 294-304 m, 40 km E of Twofold Bay (AM); 93-128 m off Green Cape (AM).

VIC: 18.2 m, 1.6 km N of Gabo I. (AM); 132-146 m, 40 km off Cape Everard (3 AM); 120 m off Cape Everard (MV); 100-183 m S of Mt Cann (AM); Gippsland Coast (MV); Lakes Entrance (MV); 6-45 m off Lakes Entrance (AM); Port Albert (MV); 77 m, 40 km S of Wilsons Promontory (AM); 64-69 m S of Waratah Bay (4 MV).

TAS: 421 m E of North Point, Flinders I. (MV). Flinders I. (AM); 32 km E of Babel I., Furneaux Group (2 AM); 118-119 m Babel I. (2 AM); 155 m N of Port Davey (AM); 82-91 m, 4 km NE Beaching Bay, Maria I. (2 AM); 80 m W of West Point (AM).

SA.: Beachport (2 MV); 201 m off Beachport (AM; MV); 667 m off Beachport (AM); 183 m, 64 km S of Cape Wiles (2 AM).

WA: 75 m, 33°05'S; 128°40'E, Great Australian Bight (AM).

Distribution

Queensland to Great Australian Bight, Western Australia; also Tasmania.

Remarks

The great majority of the specimens of *S. woodsi* examined came from relatively shallow water, 100 m or less in depth, but a significant portion of the specimens came from much greater depths. The greatest depth was from 1463 m 56 km east of Sydney (C.26694). All deep water lots consisted of dead taken shells, many of which were broken. Examination of these lots however showed that all could not be distinguished from typical *S. woodsi*, suggesting that unless the shells were moved after death the species has a considerable depth range. Hedley (1922) also recorded a number of deep water records of *S. woodsi*.

As can be seen from the extensive list of material examined, *S. woodsi* is a common species in eastern Australia, with a wide geographic and vertical range. It is not surprising that the species varies somewhat and that it has been named several times. Cotton (1947) described *Antimelatoma agasma* from two specimens collected in deep water, with the holotype coming from 183 m depth off Beachport. Cotton compared the species with "*C.*" *harpularia*, but the specimen is clearly a large individual of *S. woodsi*. There are fine spiral lirae just below the suture, but not the strong spiral cords found on "*C.*" *harpularia*. The other feature of *A. agasma* is that there is a better developed spiral cord just below the suture than in more typical *S. woodsi*. *S. molleri* is also a fairly large specimen of *S. woodsi*. It lacks the indistinct spiral cord of *A. agasma* but fits in other features with typical *S. woodsi*. *Drillia howitti* strongly resembles *A. agasma* but the spiral cord is not as distinct and the ribs are more nodulose. In all other respects the species is similar to typical *S. woodsi*.

Sysoev and Kantor (1989) described *Splendrillia chathamensis* from the western part of the Chatham rise. The species is close to *S. woodsi*, but was distinguished by Sysoev and Kantor by having more slender, white shell with fewer ribs, the lack of a notch at the end of the canal and a heavy parietal callus.

Splendrillia acostata (Verco, 1909)

Plate 3, Figs. 1,2.

Drillia woodsi acostata Verco, 1909: 301. Powell, 1966: 83.

Melatoma woodsi acostata (Verco). Hedley, 1922: 253.

Splendrillia acostata (Verco). Cotton, 1947: 11. Cotton, 1959: 393.

Shell

Shell medium, 21 mm, light, very high spire. Protoconch globose, smooth, of 2 whorls, 0.60 mm high, 0.87 mm wide; teleoconch up to 9 whorls. Suture impressed,

whorls convex, almost triangular in outline with slight constriction on upper surface. Faint axial ribbing on upper whorls does not extend to lower whorls, only sculpturing is axial growth lines. Lower whorls smooth. Aperture elongated, cylindrical, columella smooth, broad. Sinus very deep, U shaped with callus which slightly constricts entrance. Anterior canal broad, deep, notched. Colour off white, aperture similar. Radula and operculum unknown.

Measurements

	Length (mm)	Width (mm)	Aperture (mm)	W/L	A/L
SAM syntype	21.4	5.8	6.7	0.27	0.31
AM syntype	17.5	4.9	5.7	0.28	0.33
MV syntype	17.2	5.0	5.6	0.29	0.33

Location of types

Syntypes, 1 specimen each. SAM D.13550. AM C.31075. MV F.30412.

Type locality

368 m depth, off Beachport, SA.

Material examined

Types. WA: 146-150 m depth, SW of Mandurah (AM).

Distribution

The specimens here regarded as syntypes are all from 368 m depth off Beachport. In his description of the species Verco (1909) lists a total of 60 specimens from that locality and also 201 m and 275 m off Beachport and 238 m off Cape Jaffa; the present location of specimens from the latter three locations is not known. The W. A. record is the first report of *S. acostata* since the original description and the first record from Western Australia.

Remarks

Verco (1909) originally proposed *S. acostata* as a subspecies of *S. woodsi*. Cotton (1959) however regarded it as a valid species, an opinion with which I concur. There is a specimen of typical *S. woodsi* in the AM (C.31063) from 201 m off Beachport, S. A. collected by Verco from near the type locality of *S. acostata*, indicating the two species occur sympatrically, but *S. acostata* appears to be more common in deeper water. *Splendrillia acostata* can be readily separated from *S. woodsi* by having a thinner shell, narrower spire, more rounded whorls, and in lacking pronounced ribs.

The specimen from off Mandurah, Western Australia greatly extends the range of the species.

Splendrillia spadicina (Hedley, 1922)

Plate 3, Figs. 3-4.

Melatoma spadicina Hedley, 1922: 252, 253, pl. 45, fig. 45.

Antimelatoma spadicina (Hedley), Cotton, 1947: 11.

Splendrillia spadicina (Hedley). Laseron, 1954: 17, pl. 3, figs. 68, 69. Iredale and McMichael, 1962: 77. Powell, 1966: 83.

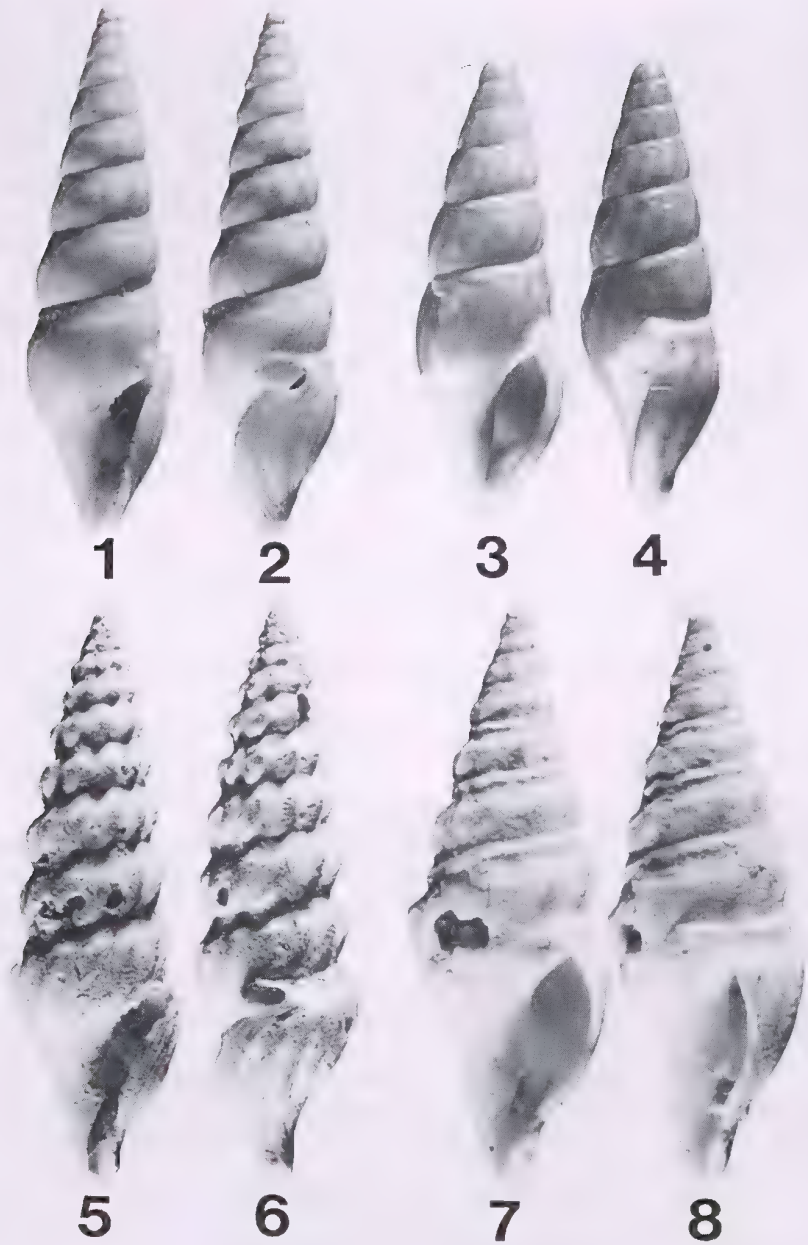


Plate 3. *Splendrillia*. Figs. 1,2. *Drillia woodsi acostata* Verco, 1909. Syntype, C.31075. Figs 3,4. *Melatoma spadicina* Hedley, 1922. Syntype, AM C.156577. Figs. 5,6. *Melatoma lygdina* (Hedley, 1922). Holotype, AM C.42317. Figs. 7,8. *Drillia bednalli* Sowerby, 1896. Paratype, AM C.19290.

Shell

Shell small, 24 mm, light, very high spire. Protoconch bulbous, smooth, 2 whorls, grades into teleoconch of up to 7 whorls. Sutures impressed, whorls convex but constricted just below suture. About 14 strong ribs/whorl extend from constriction to next whorl. Bases of ribs offset to left. Fine spiral striae and axial growth lines present. Aperture elongate, thin, siphonal notch deep with callus at entrance. Columella thin, smooth, siphonal canal broad, smooth. Shell glossy brown on grey, aperture brown. Radula and operculum unknown.

Measurements

	Length (mm)	Width (mm)	Aperture (mm)	W/L	A/L
Paratypes C.42311	22.1	7.7	8.4	0.35	0.38
C.156577	23.9	7.0	8.5	0.29	0.36
	20.2	6.6	7.7	0.33	0.38
Mean (n=12)	21.8	7.3	8.0	0.33	0.37
S. D.	1.3	0.5	0.4	0.02	0.02
Range	20.2-	6.5-	7.3-	0.29-	0.33-
	23.9	8.0	8.5	0.37	0.41

Location of types

Paratypes: 4 specimens, AM C.42311; 3 specimens, AM C.10428; 2 specimens, AM C.156577.

Type locality

Woolgoolga, NSW.

Material examined

Types. NSW: Woolgoolga (2 AM); Little River (AM); Catherine Hill Bay (AM); Thirroul (AM); Angourie, near Yamba (2 AM); Clarence River (2 AM); Collaroy Beach, Sydney (2 AM).

Distribution

Known only from New South Wales.

Remarks

The material available of *Splendrillia spadicina* is all dead collected, and resembles somewhat dead collected material of "*C.*" *ansonae*. However, "*C.*" *ansonae* has a thinner shell and a strongly recurved outer lip. *S. acostata* is also similar to "*C.*" *ansonae*, but has a much higher spire, more numerous whorls (11 vs 9) and a higher protoconch.

***Splendrillia lygdina* (Hedley, 1922)**

Plate 3, Figs. 5,6.

Melatoma lygdina Hedley, 1922: 252, pl. 45, fig. 45.

Splendrillia lygdina (Hedley). Laseron, 1954: 17, pl. 4, fig. 70. Iredale and McMichael, 1962: 77. Macpherson and Gabriel, 1962: 232. Powell, 1966: 83.

Shell

Shell of medium length, 26 mm, spire very high, turreted medium weight. Protoconch broken off. Sutures slightly impressed, straight. Strong, rounded ribs begin one-third of the way down the whorl, reach their greatest dimension in the middle of the whorl, then taper off. 12 ribs on penultimate whorl; last rib of body whorl replaced by three riblets. Ribs extend well down body whorl; there is no spiral sculpture below. Sinus very deep, U shaped at bottom, edges raised. Outer lip thin. Columella smooth, convex. Anterior siphonal canal moderately deep, of moderate length. Aperture deep, elongated, narrow. Shell yellowish grey. Radula and operculum unknown.

Measurements

	Length (mm)	Width (mm)	Aperture (mm)	W/L	A/L
Holotype	26.3	8.1	9.2	0.31	0.35
Mean (n=9)	22.1	7.3	7.8	0.32	0.35
S. D.	3.3	1.1	0.9	0.32	0.35
Range	17.0- 27.2	6.0- 8.1	6.0- 9.2	0.26- 0.35	0.30- 0.38

Location of type

Holotype. AM C.42317.

Type locality

274-366 m depth, off Gabo I., Vic.

Material examined

Holotype. VIC: 640 m ENE North Point, Flinders I. (MV); 400 m S of Point Hicks (MV); 800 m S of Point Hicks (MV); 930 m S of Point Hicks (2 MV).

Distribution

Known only from 274-930 m off Victoria.

Remarks

Splendrillia lygdina is a large species which cannot be confused with the other members of the genus because of its very high spire, numerous whorls and very strong ribbing.

The only published data on this species refer to the holotype, which until recently was the only known specimen. The material in the MV reported here was collected by the 'Kimbla' in 1973.

***Splendrillia bednalli* (Sowerby, 1896)**

Plate 3, Figs. 7,8.

Drillia bednalli Sowerby, 1896: 25, pl. 3, fig. 3. Tate and May, 1901: 368. Verco, 1909: 302.

Melatoma bednalli (Sowerby). Hedley, 1922: 250, pl. 45, fig. 41.

Splendrillia bednalli (Sowerby). Cotton, 1947: 11, pl. 1, f. 3. Cotton, 1959: 393. Powell, 1966: 83.

Shell

Shell small, 18 mm, medium weight, high spired. Protoconch of 2 whorls, rounded, smooth, 0.67 mm high, 1.00 mm wide; teleoconch of up to 8 whorls. Surface of largest syntype smooth; other specimens have up to 13 nodulose ribs on upper part of whorls, smooth below. The ribless specimen also lacks spiral striae. The other syntypes have numerous fine spiral striae on all whorls. Sutures slightly impressed, indistinct, whorls convex except for slight compression below suture. Aperture elongate oval, strong callus adjacent to siphonal notch, notch deep, U shaped, columella convex, anterior siphonal canal broad, slightly notched, shallow. Outer lip thickened, slightly reflected inwards. Stromboid notch distinct. Shell white with 6-9 thin brown spiral lines on body whorl, 2-3 on upper whorls, inner aperture white. Operculum and radula unknown.

Measurements

	Length (mm)	Width (mm)	Aperture (mm)	W/L	A/L
Syntypes					
BM(NH) 1896.7.15.2	17.5	6.2	7.2	0.35	0.41
BM(NH) 1899.7.5.10-11	12.9	5.0	5.5	0.39	0.43
	11.5	4.3	4.6	0.37	0.40
SAM D.13548	16.2	5.9	6.7	0.36	0.41

Location of types

Syntype, 1 specimen. SAM D.13548. Syntypes, 3 specimens. BM(NH) 1896.7.15.2 and 1896.7.5.10-11.

Type locality

Gulf St. Vincent, SA.

Material examined

Syntypes. S.A.: 73 m, Neptune I. (AM); Gulf St. Vincent (AM).

Distribution

Known only from off South Australia.

Remarks

Splendrillia bednalli is similar to the *agasma* form of *S. woodsi*, particularly in general shape and the presence of a fairly strong spiral cord, but the ribbing is not as strong as it is in all *S. woodsi*. *Splendrillia bednalli* is similar to "*C. harpularia*" but is more variable, and differs in lacking the strong spiral striae and having the verticals low and rounded in comparison to the thinner and more distinct ribs of "*C. harpularia*". The ribs present in the SAM syntype do not appear on some of the other specimens. The characteristic feature of *S. bednalli* is the series of brown lines. It resembles *A. agasma*, particularly in having the spiral cord below the suture, but the material of *A. agasma* lacks the brown lines.

Splendrillia subviridus (May, 1911)

Plate 4, Figs. 1,2.

Melatoma subviridus May, 1911: 392, pl. 14, fig. 18. Hedley, 1922: 253.*Antimelatoma subviridus* (May). Cotton, 1947: 11. Macpherson and Gabriel, 1962: 232.**Shell**

Shell medium, 16 mm, medium weight, high spire. Protoconch large, rounded, 2 whorls, 0.74 mm high, 1.12 mm wide; teleoconch of 6 whorls. Suture slightly impressed, straight. Whorls slightly rounded. Sculpturing of 16 strong axial ribs on body whorl, 15 on penultimate whorl. Originate as low nodules just below suture, angled to right. At about 1/3 down the whorl ribs shift to be slightly angled to the left. Ribs extend only part way down body whorl, replaced by several axial striae, the first two of which are strongest. Outer lip rounded with slight stromboid notch. Sinus deep, U shaped, callus strong. Aperture rectangular, columella broad. Anterior canal broad, of moderate depth. Cream colour, aperture white. Radula and operculum unknown.

Measurements

	Length (mm)	Width (mm)	Aperture (mm)	W/L	A/L
Holotype	16.2	6.2	7.0	0.38	0.43
Paratypes	19.1	6.8	7.8	0.36	0.41
	14.9	5.5	5.7	0.37	0.38

Location of type

Holotype. TM E.721/8062.

Type locality

17 m depth, Derwent estuary, Tas.

Material examined

Types.

RemarksThis species is closest to the tropical "*C.*" *duplaris*, but lacks the spiral striae.*Splendrillia nenia* (Hedley, 1903)

Plate 4, Figs. 3,4.

Drillia nenia Hedley, 1903: 387, text. fig. 101.*Austrodrillia nenia* (Hedley). Hedley, 1918: M81. Cotton, 1947: 10. Cotton, 1959: 393.*Splendrillia nenia* (Hedley). Laseron, 1954: 16, pl. 3, figs 65-67. Iredale and McMichael, 1962: 77. Macpherson and Gabriel, 1962: 232. Powell, 1966: 83.**Shell**

Shell small, 6.5 mm, high spire, fragile. Protoconch smooth, globose, 1.5 whorls, 0.53 mm high, 0.73 mm wide; 5 teleoconch whorls. Suture distinct but irregular.

Whorls with prominent axial ribs, slightly curved to right at base, do not match on adjacent whorls. Ribs begin at suture, increase rapidly to midpoint of whorl, then decrease to lower suture, give whorl a triangular shape. 12 ribs on penultimate whorl, 10 on body whorl. Ribs extend only part way down body whorl. Last rib enlarged to form partial varix; outer lip thin, slightly curved inwards. Fine axial growth lines present, but no spiral sculpture. Sinus broad, deep, at 45° angle to shell axis. Callus present but not prominent. Columella thin, straight. Aperture elongate-oval. Anterior canal broad, short, not notched. Colour uniform semiglossy white. Radula and operculum unknown.

Measurements:

	Length (mm)	Width (mm)	Aperture (mm)	W/L	A/L
Holotype	6.5	2.5	2.8	0.38	0.43
Other specimens (n=8) Mean	6.4	2.7	2.8	0.42	0.44
S.D.	0.2	0.5	0.4	0.06	0.06
Range	6.2- 6.7	2.2- 3.4	2.5- 3.8	0.35- 0.51	0.40- 0.57

Location of type

Holotype. AM C.16744.

Type locality

44 m depth off Cabbage Tree I., Port Stephens, NSW.

Material examined

Types.

QLD: 284 m, E of North West I. (AM); 320 m, E of North West I. (2AM); 339 m, 39 km E of Lady Musgrave I. (AM); 357 m, 40 km E. of Lady Musgrave I. (AM); 365 m, NE of Lady Musgrave I. (AM); 114-124 m, NE of Cape Moreton (AM); 115-119 m, NE of Cape Moreton light (AM). NSW: 203m E of Cape Byron (AM); 40m off Manning River mouth (AM); Cabbage Tree I., Port Stephens (AM); 75-91m Cape Three Points, south of Tuggerah Lakes (AM); 146m, 35km E of Narrabeen (2 AM); 55-64 m off Crookhaven, NSW (2 WAM); 0-102m off Botany Heads (AM); 112-203 m, 29 km off Malabar (AM); 200 m off Sydney (AM); 384 m off Sydney (AM); 393 m off Sydney (AM); 549 m off Sydney (AM); 99-128m off Wattamolla, (AM); 115-137m off Port Kembla (AM); 40km off Twofold Bay (AM); 91-128m off Green Cape (AM); VIC: 43 km SE of Cape Everard (AM); 146-158 m between Cape Howe and Lakes Entrance (AM); 155 m SE of Lakes Entrance (AM).

Distribution

0-549 m depth, North West I., Queensland to Lakes Entrance, Victoria.

Remarks

See comments under *S. eburnea*.

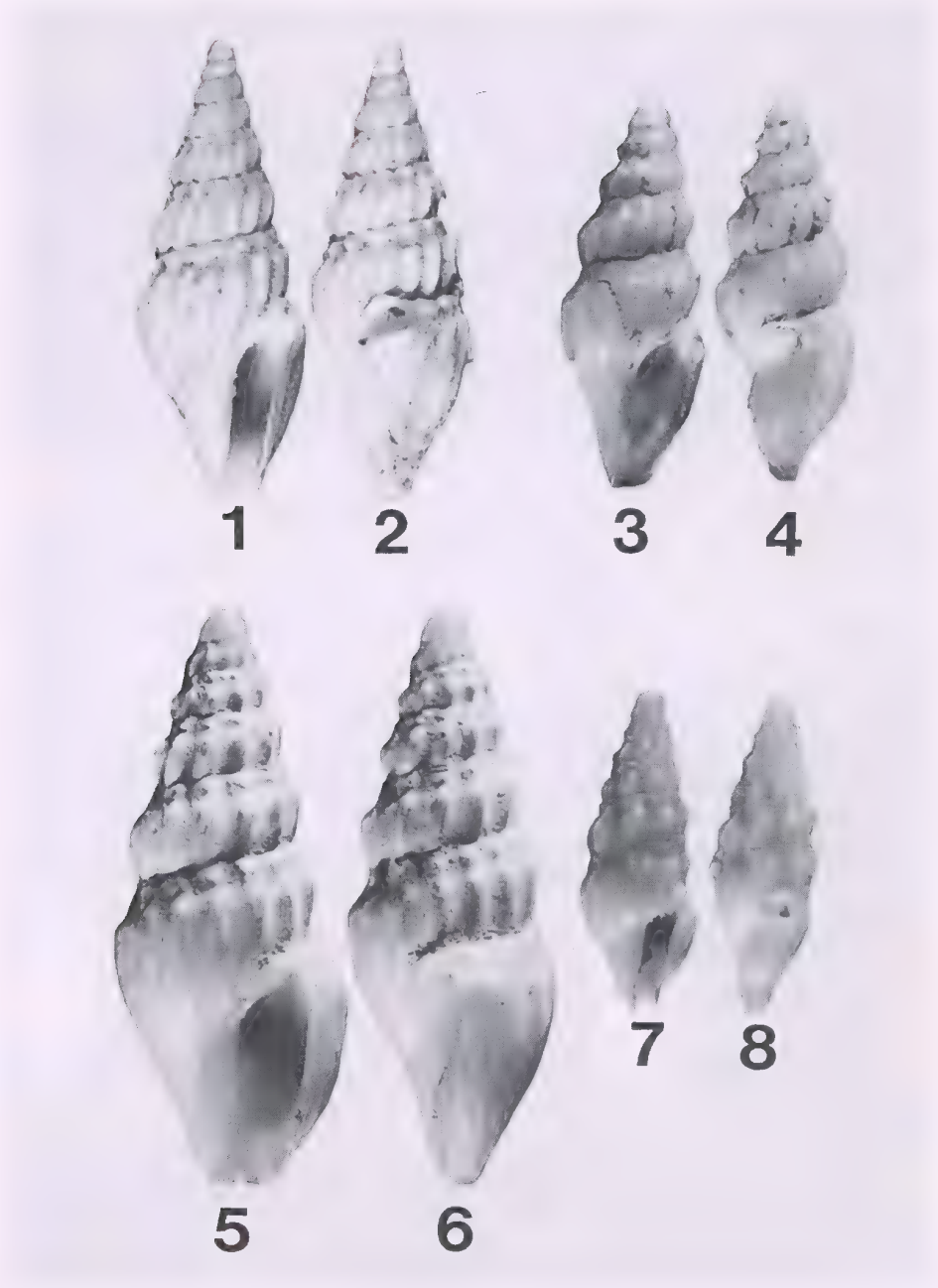


Plate 4. Splendrillia. Figs. 1,2. *Melatoma subviridus* May, 1910. Holotype, TM E.721/8062. Figs. 3,4. *Drillia nenia* Hedley, 1903. Holotype, AM C.16744. Figs. 5,6. *Melatoma eburnea* Hedley, 1922. Holotype, AM C.103542. Figs. 7,8. *Clavus candidulus* Hedley, 1922. Holotype, AM C.2675.

Splendrillia eburnea Hedley, 1922

Plate 4, Figs. 5,6.

Melatoma eburnea Hedley, 1922: 251, pl. 45, fig. 43.*Splendrillia eburnea* (Hedley). Laseron, 1954: 16, pl. 3, fig. 64. Iredale and McMichael, 1962: 77. Macpherson and Gabriel, 1962: 232. Powell, 1966: 83.**Shell**

Shell small, 10 mm, light, high spire. Protoconch dome shaped, smooth, glossy, of 2 whorls, 0.53 mm high, 0.93 mm wide; teleoconch of 5 whorls. Suture impressed with indistinct spiral cord just below. About 14-15 low rounded ribs extend below the constriction to the next suture. These angle to the left in apertural view but above the constriction they angle to the right. Ribs on body whorl do not reach base; last rib enlarged. Whorls have very fine spiral striae and growth lines. Lip thin, simple, aperture elongate, columella broad, anterior siphonal canal short, broad, shallow. Sinus broad, shallow, small callus present. Shell yellowish white, aperture glossy white. Radula and operculum unknown.

Measurements

	Length (mm)	Width (mm)	Aperture (mm)	W/L	A/L
Holotype	9.8	3.9	3.9	0.40	0.40
Mean (n=8)	7.3	2.8	2.8	0.39	0.38
S.D.	1.3	0.5	0.5	0.02	0.04
Range	5.7- 9.8	2.3- 3.9	2.3- 3.9	0.37- 0.42	0.37- 0.42

Location of types

Holotype. AM C.103542. Paratypes: 1 specimen, AM C.110780; 8 specimens, AM C.103543.

Type locality

146 m depth off Gabo I., Vic.

Material examined

Types.

NSW: 384 m off Sydney (AM); 457 m off Sydney (AM); 549 m off Sydney (AM); 281 m E of Wollongong (AM); 274 m S of Eden (AM); VIC: 402-438 m SE of Gabo I. (AM).

Distribution

274-549 m off southern New South Wales and eastern Victoria.

Remarks

It is odd that in his description of *Melatoma eburnea* Hedley (1922) compared it with *Pleurotoma laevis* Hutton, a New Zealand species currently recognized as *S. aoteana* Finlay, 1930 (Powell, 1979), but not *Drillia nenia*. The comparison was made by Laseron (1954) who found the two species to be very close but *S. nenia* smaller, relatively broader with fewer and more prominent axial ribs. However Laseron (1954) himself figured a 9 mm specimen of *S. nenia*, only slightly smaller

than the holotype of *S. eburnea*. Comparison of the holotypes of the two species reveals that the width/length ratios are virtually identical: 0.40 for *S. nenia* and 0.38 for *S. eburnea*, negating the suggestion that *S. nenia* is broader. Differences in rib counts and size are simply a reflection of the smaller size of the *S. nenia* holotype, but the ribs of *S. nenia* are heavier. There is also a tendency for the development of a spiral cord just below the suture of *S. eburnea* which is absent in *S. nenia*.

Comparison of two paratypes of *Pleurotoma laevis* Hutton, 1873 (AM C.16634) with the holotypes of both *Drillia nenia* Hedley, 1903 and *Melatoma eburnea* Hedley, 1922 shows that the three are very closely related. The measured shell of *P. laevis* is longer than the other two (12.8 mm) but is of a similar slenderness ($W/L = 0.39$) with a similar number of ribs. However *P. laevis* differs in having a larger protoconch, less pronounced ribs which begin only on the second teleoconch whorl instead of the first, and less angular whorl. In addition there are no beads above the constriction on the upper part of each whorl of *P. laevis*.

Splendrillia candidula (Hedley, 1922)

Plate 4, Figs. 7,8.

Clavus candidulus Hedley, 1922: 255, 256, pl. 45, fig. 47.

Austroclavus candidulus (Hedley). Cotton, 1947: 1-12.

Shell

Shell small, 11 mm high, high spire, glossy white. Small, smooth, rounded glossy protoconch of 2 whorls, 0.33 mm high, 0.60 mm wide. 5 teleoconch whorls. Whorls with low ribs, up to 8 per whorl becoming more spaced with growth; last half of body whorl without ribs. Ribs go down entire whorl but are constricted just below suture. Numerous fine growth lines. Columella broad, glossy. Aperture elongate, siphonal canal broad, moderate length; posterior canal narrower but distinct. Outer aperture squarish, slightly thickened, curved in. Color uniform glossy white. Radula and operculum unknown.

Measurements

	Length (mm)	Width (mm)	Aperture (mm)	W/L	A/L
Holotype	5.3	2.0	2.1	0.38	0.40
Paratypes	5.8	2.1	2.0	0.36	0.34
	5.1	2.0	2.0	0.39	0.39

Location of types

Holotype. AM C.2675 (part). Paratypes, 2 specimens AM C.2675 (part).

Type localities

18 m depth, Cape Sidmouth, Qld. (*quisqualis*), 36 m. depth, off Darnley I., Torres Strait, Qld.

Material examined

Types.

QLD: 114-124 m off Cape Moreton (AM); 22 m off Mulgrave I. (AM).

Distribution

18-124 m depth, known only from Queensland.

Remarks

Splendrillia candidulus was included in the genus *Clavus* by Hedley (1922). However it is closer to several of the small species included in *Splendrillia* than it is to the tropical Australian *Clavus* and is here transferred to *Splendrillia*.

Splendrillia candidulus can be differentiated from *S. nenia* by being larger but having fewer ribs that are larger and more rounded than those of *S. nenia*. The species is also close to *S. hedleyi* but has a smaller A/L ratio (0.40 vs 0.45), fewer teleoconch whorls (5 vs 7), and fewer axial ribs (8 vs 13).

***Splendrillia buicki* n. sp.**

Plate 5, Figs. 1,2.

Shell

Shell small, 7 mm, high spire, light weight. Protoconch low, but globose, smooth, 2 whorls, 0.47 mm high, 0.73 mm wide. Up to 6 rounded teleoconch whorls. Suture distinct, nearly straight. Upper surface of whorls with spiral cord. Heavy, broad axial ribs extend from margin of spiral cord to lower suture. 10 ribs on penultimate whorl, 7 on body whorl. Ribs do not extend below shoulder of body whorl. Final rib enlarged to form low varix on upper part of whorl; final one-third of body whorl lacks ribs. Fine axial growth lines present but no spiral sculpture apart from cord. Outer lip thin, rounded with a hint of a stromboid notch. Sinus deep, constricted at entrance by lip. Small callus present. Columella thin, slightly convex. Anterior end of shell truncate, anterior canal broad, short, not notched. Aperture subrectangular. Base colour white, yellowish between ribs. Thin spiral yellow line at base of spiral cord. Additional line near base of lower whorls, 4 lines on body whorl. Prominent yellow blotch on lip side of varix. Radula and operculum unknown.

Measurements

	Length (mm)	Width (mm)	Aperture (mm)	W/L	A/L
Holotype	5.0	1.9	2.0	0.38	0.40
Paratypes (n=4)					
Mean	5.7	2.0	2.3	0.35	0.40
S.D.	0.7	0.2	0.1	0.01	0.03
Range	5.1- 6.7	1.8- 2.2	2.1- 2.4	0.33- 0.36	0.36- 0.43

Holotype

183 m depth NW of Beagle I., W.A. (29°43.5'S; 114°20'E) (WAM 852-89).

Paratypes

WA: 80 m depth, Recherche Archipelago (34°19.5'S; 121°27'E) (WAM 856-89; SAM); 81 m depth, Recherche Archipelago (34°09'S; 121°27'E) (AM C.161082; WAM 854-89; NMNZ); 76 m depth, off Albany (35°06'S; 118°39'E) (AM

C.161083); 161-165 m depth, NW of Bunbury (33°15'S; 114°36'E) (AM C.161076); 176-182 m depth, W of Garden I. (32°15.7'S; 115°06.7'E) (WAM 853-89); 210-212 m depth, W of Garden I. (32°15'S; 115°07'E) (AM C.161077); 201-214 m depth, W of Rottneest I. (31°59.5'S; 114°13'E) (AM C.161080); unknown depth, off Rottneest I. (31°40.2'S; 115°09.3'E) (AM C.161081); 192-256 m depth, NW of Cervantes (30°30'S; 114°38'E) (AM C.161078; MNHN); 154 m depth, WNW of Lancelin (30°58'S; 114°53'E) (WAM 851-89); 128-140 m depth, NW of Green Head (30°37'S; 114°38'E) (AM C.161079). All material was collected during cruises by HMAS 'Diamantina' and HMAS 'Moresby'.

Range

76-256 m depth, from the Recherche Archipelago to NW of Beagle I., W. A.

Etymology

This species is named in honor of Mr. G. M. Buick in recognition of his numerous services to malacology over many years and in more recent years his help with this turrid research.

Remarks

Splendrilla buicki has a very smooth surface and is characterised by the spiral lines which do not occur on other species. See comments under *S. longbottomi*.

Splendrilla longbottomi n. sp.

Plate 5, Figs. 3,4.

Shell

Shell very small, 5 mm, high spire, medium weight. Protoconch high, smooth, rounded, 2.5 whorls, 0.53 mm high, 0.93 mm wide. 4 teleoconch whorls with irregular margins. Suture impressed, wavy. Strong, thin axial ribs extend suture to suture; 14 on penultimate whorl, 16 on body whorl, often match on adjacent whorls. Ribs start at suture, form low nodules, decrease, then reach a second peak at midpoint of whorl. Outer lip thickened, rounded. Sinus broad, shallow. Callus distinct. Columella thin, slightly convex. Aperture broad, rectangular. Shell truncate, anterior canal short, broad, not notched. Colour uniform off white in dead collected shells. Radula and operculum unknown.

Measurements

	Length (mm)	Width (mm)	Aperture (mm)	W/L	A/L
Holotype	4.7	2.0	2.1	0.43	0.45
Paratypes (n=4)					
Mean	4.7	1.7	2.0	0.37	0.42
S.D.	0.5	0.2	0.2	0.02	0.04
Range	4.0- 5.0	1.5- 1.9	1.8- 2.1	0.35- 0.38	0.37- 0.48

Holotype

165 m depth, off Rottneest I., W.A. (31°44.9'S; 115°08.3'E) (WAM 855-89).



Plate 5. *Splendrillia*. Figs. 1,2. *Splendrillia buicki* n. sp. Holotype, WAM 852-89. Figs. 3,4. *Splendrillia longbottomi* n. sp. Holotype, WAM 855-89. Figs. 5,6. *Splendrillia hansena* n. sp. Holotype, WAM 72-90. Figs. 7,8. *Splendrillia hedleyi* n. sp. Holotype, AM C.161066.

Paratypes

WA: 81 m depth, Recherche Archipelago (34°09'S; 121°27'E) (SAM); 200-221 m depth, NW of Bunbury (33°00'S; 114°37'E) (AM C.161071); 176-182 m depth, W of

Garden I. (32°15.7'S; 115°06.7'E) (WAM 857-89); 210-212 m depth, W of Garden I. (32°15'S; 115°07'E) (AM C.161072); 182 m depth, W of Rottneest I. (31°59'S; 115°14'E) (AM C.161075); 201-214 m depth, W of Rottneest I. (31°59.5'S; 115°13'E) (NMNZ); 139 m depth, Direction Bank, off Rottneest I. (31°44.4'S; 115°12.2'E) (AM C.161070); 150 m depth, off Rottneest I. (31°39.8'S; 115°07.1'S) (MNHN); 154 m depth, WNW of Lancelin (30°58'S; 114°53'E) (AM C.161073); 183 m depth, NW of Beagle I. (29°43.5'S; 114°20'E) (AM C.161074). All specimens were collected on cruises of HMAS 'Diamantina' and HMAS 'Moresby'.

Range

80-214 m depth, Recherche Archipelago to WNW of Lancelin, WA.

Etymology

I name this species after Mr. A. F. Longbottom in acknowledgement of the considerable help he has given me at the Western Australian Museum over the last 14 years.

Remarks

Splendrillia longbottomi occurs sympatrically with *S. buicki*, but is readily distinguished by a number of features, including having a smaller, heavier shell with thinner ribs with nodules just below the suture, the ribs extending well down the body whorl, followed by spiral striae, a varix is absent, and the shell has a more irregular appearance.

Splendrillia hansenae n. sp.

Plate 5, Figs. 5,6.

Shell

Shell small, 13 mm, high spire, medium weight. Protoconch of 2 whorls, low, 0.86 mm high, 1.35 mm wide, rounded. Up to 6 teleoconch whorls. Suture straight, distinct. Whorls flat on upper surface, slight lines towards right enlarge rapidly at midwhorl into about 14 large, rounded ribs which orient to left to base of whorl; ribs largest at centre of whorl. Ribs extend only part way down body whorl. Surface smooth, no spiral sculpture. Outer lip thickened, rounded. Sinus broad, moderately deep, with distinct callus above. Columella thin, slightly convex. Aperture oval. Anterior canal broad, short, shallow. Colour uniform pink, tops of ribs lighter, protoconch darker; aperture pink.

Measurements

	Length (mm)	Width (mm)	Aperture (mm)	W/L	A/L
Holotype	11.1	4.6	4.3	0.41	0.39
Paratypes (WAM 264-65)					
Mean (n=6)	11.5	4.4	4.5	0.39	0.39
S.D.	1.3	0.5	0.7	0.03	0.03
Range	9.7- 13.2	3.8- 4.9	3.8- 5.4	0.36- 0.43	0.35- 0.44

Holotype

Augusta, W.A. (WAM 72-90).

Paratypes

WA: Augusta (WAM 73-90) 14 specimens; Cape Leeuwin Lighthouse, Augusta (WAM 54-90) 3 specimens; Windy Harbour, Cape d'Entrecasteaux (WAM 264-65) 6 specimens.

Other material examined

Parry's Beach, between Denmark and Walpole (G. M. Hansen Colln.).

Range

Known only from the western portion of the south coast of Western Australia.

Etymology

I am pleased to name this species after Mrs. G. M. Hansen in recognition of the tremendous assistance she has provided to me at the Western Australian Museum over the last 14 years, and in particular for her help with the turrid research project over the last two years.

Remarks

The bright pink colour easily distinguishes *S. hansenae* from all other Australian representatives of the genus. It is intermediate in size between the large species of the genus such as *S. spadicina* and smaller species such as *S. buicki*, though it is closer to the latter in size. *Splendrillia hansenae* also lacks the strong ribbing of *S. buicki*. It resembles *Austrodrillia subplicata* but is larger, pink coloured, has a less rounded aperture stronger shoulder and less distinct suture.

***Splendrillia hedleyi* n. sp.**

Plate 5, Figs. 7,8.

Shell

Shell small, 10 mm, very high spired, light weight. Protoconch globose, smooth, 2 whorls, 0.67 mm high, 0.93 mm wide. Up to 7 teleoconch whorls. Suture thin but distinct, nearly straight. Whorls pointed at middle. Upper and lower parts of whorls smooth, centre has a series of short, high ribs; 13 on body whorl, 11 on penultimate whorl, extend well down rostrum of body whorl. Surface of shell smooth except for very fine axial growth striae. Outer lip thin, reflected inwards, with slight stroboid notch. Sinus extremely deep, sides straight. Callus low. Columella broad posteriorly, tapers anteriorly, slightly convex. Aperture long, narrow. Shell truncate, anterior canal short, moderate width, narrowed at middle by outer lip, not notched. Shell uniform glossy white. Radula and operculum unknown.

Measurements

	Length (mm)	Width (mm)	Aperture (mm)	W/L	A/L
Holotype	9.9	3.9	4.5	0.39	0.45
Paratypes					
Mean (n=4)	9.7	3.5	4.2	0.36	0.43
S.D.	0.8	0.3	0.3	0.05	0.02
Range	9.0- 10.4	3.3- 3.8	4.0- 4.6	0.36- 0.37	0.40- 0.45

Holotype

613-668 m depth off Cairns, Qld. (19°09'36-42"S; 146°42'00-24"E) (AM C.161066).

Paratypes

QLD: 613-668 m depth off Cairns (19°09'36-42"S; 146°42'00-24"E) (AM C.161067); 476-531 m depth, E of Lady Elliot I. (24°00'S; 153°06.5'E) (AM C.161068); 604 m depth, E of Sandy Cape (24°43.5-8'S; 153°33.4-33'E) (WAM 858-89); 114-124 m depth NE of Cape Moreton (2 AM C.161069; WAM 859-89; MNHN; MV; NMNZ; QM; SAM; ZMA). Much of the type material was collected on cruises of HMAS 'Kimbla'.

Range

114-668 m depth, from off Cairns south to off Cape Moreton, Qld.

Etymology

I name this species after Charles Hedley in recognition of the considerable contribution he made to our knowledge of Australian turrids.

Remarks

Splendrillia hedleyi is similar to *S. nenia* but is larger, has a higher spire, more whorls, and has shorter but more pointed ribs. It is also similar to *S. candidulus* but has a thinner spire, a thinner, more elongate aperture, and shorter, more pointed ribs.

Splendrillia powelli n. sp.

Plate 6, Figs. 1,2.

Shell

Shell small, 9 mm, high spired, medium weight. Protoconch high, rounded, smooth, 2 whorls, 0.53 mm high, 0.73 mm wide. Up to 6 teleoconch whorls. Suture thin, distinct, straight. Upper part of upper whorls smooth but a spiral cord develops on lower whorls. Middle of whorls have broad, heavy axial ribs which extend from about one-third of the way down the whorl to the next suture; 13 ribs on penultimate whorl, 11 on body whorl which extend just to shoulder. Final rib of body whorl swollen into partial varix; remainder of whorl smooth. About 6 faint spiral striae on rostrum. Outer lip thickened. Sinus deep, V shaped. Small callus. Thin, convex columella. Aperture rectangular. Shell truncate, anterior canal short, broad, notched. Colour uniform glossy white. Radula and operculum unknown.

Measurements

	Length (mm)	Width (mm)	Aperture (mm)	W/L	A/L
Holotype	7.4	2.6	3.2	0.35	0.43
Paratypes	7.2	2.6	3.1	0.36	0.43
	8.6	3.2	3.4	0.37	0.40

Holotype

150 m depth, NE of Lady Elliot I. (24°03.7'S; 152°49.4'E) (AM C.161063).

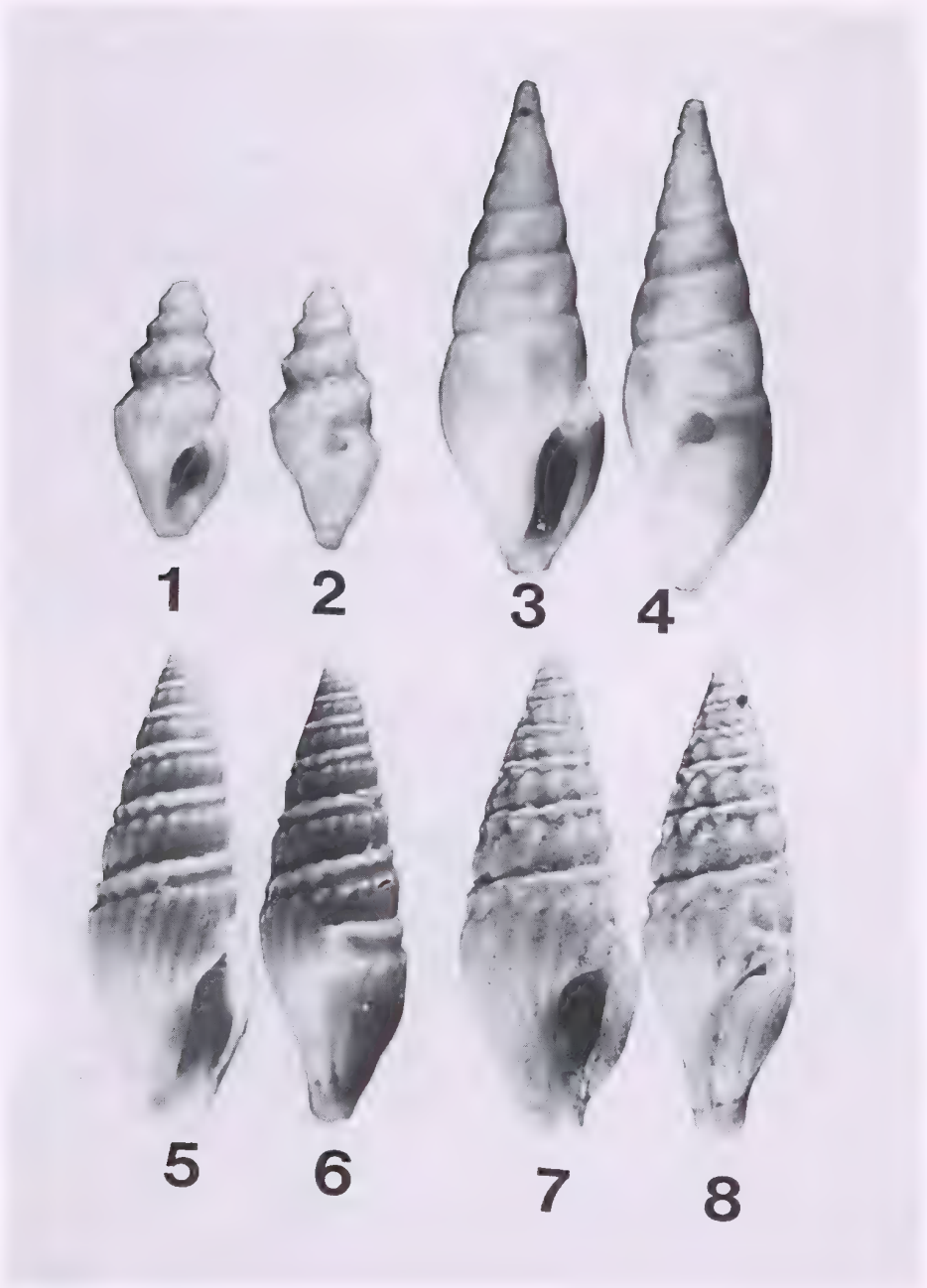


Plate 6. *Splendrillia*. Figs. 1,2. *Splendrillia powelli* n. sp. Holotype, AM C.161063. Figs. 3,4. *Drillia gratiosa* Sowerby, 1896. Syntype, SAM D.13549. "*Crassispira*". Figs. 5,6. "*Crassispira*" *harpularia* AM C.156588. Figs. 7,8. *Melatoma duplaris* Hedley, 1922. Holotype, AM C.15130.

Paratypes

QLD: 613-668 m depth, off Cairns (17°09'36-42"S; 146°42'00-24"E) (AM C.161065); 150 m depth, NE of Lady Elliot I. (24°03.7'S; 152°49.4'E) (AM C.161064; WAM 860-89); 296 m depth, E of Lady Musgrave I. (23°52.5-51.99'S; 152°42.7-41.7'E) (MNHN; QM). All type material was collected on cruises of HMAS 'Kimbla'.

Range

Known only from 150 to 668 m depth, between Cairns and Lady Elliot I., Queensland.

Etymology

I name this species after Dr. A. W. B. Powell in recognition of the considerable contribution he made to our knowledge of the family Turridae.

Remarks

Splendrillia powelli is close to *S. hedleyi* but is distinguished by the spiral cord on the upper part of the lower whorls and the varix on the body whorl. In addition *S. powelli* has longer axial ribs, a rectangular aperture, a notched anterior siphonal canal, and spiral striae on the rostrum.

***Splendrillia gratiosa* (Sowerby, 1896)**

Plate 6, Figs. 3,4.

Drillia gratiosa Sowerby, 1896: 25, pl. 3, fig. 1. Verco, 1909: 302.

Melatoma gratiosa (Sowerby). Hedley, 1922: 251.

Splendrillia gratiosa (Sowerby). Cotton, 1947: 11, pl.1, f. 1.

Antimelatoma gratiosa (Sowerby). Cotton, 1959: 393.

Shell

Shell medium, 18 mm, high spire, light weight. Protoconch high, smooth, rounded, 2 whorls, 0.90 mm high, 0.65 mm wide; teleoconch of 8 whorls. Suture straight, whorls slightly rounded, lack sculpture. Outer lip thin. Sinus deep, U shaped with small callus. Aperture rectangular, columella indistinct. Anterior canal broad, deep. Colour very light brown with off white band below suture and at bottom of body whorl. Operculum and radula unknown.

Measurements

	Length (mm)	Width (mm)	Aperture (mm)	W/L	A/L
Syntype	17.8	6.1	6.0	0.34	0.34

Location of type

Syntype, 1 specimen plus fragment. SAM D.13549.

Type locality

Gulf St. Vincent, SA.

Material examined

Syntype.

Distribution

Known only from the type locality.

Remarks

Splendrillia gratiosa is known from a single complete specimen and one small fragment. The complete specimen lacks sculpturing, but is very worn. The lack of sculpturing could simply be an artifact of the worn nature of the shell. The absence of other specimens suggests the syntype of *S. gratiosa* may be a specimen of another species that is simply too worn to be identified.

SUBFAMILY CRASSISPIRINAE MORRISON, 1966

Morrison, 1966: 1,2. McLean, 1971: 119-123. Kilburn, 1988: 232-298.

Diagnosis

Shells claviform, small to large, high spire, protoconch smooth, anterior canal short to moderate, anal sinus on shoulder, parietal callus poorly developed or absent, operculum oblongate. Radula usually of marginal teeth only. Probably present in Upper Cretaceous to Recent, widespread distribution.

Genus *Crassispira* Swainson, 1840**Diagnosis (for Australian species).**

Shells small to large, 8 to 30 mm, high to very high spired, protoconch smooth of about 2 whorls. 6 to 9 teleoconch whorls. Sculpture nearly smooth ("*C. ansonae*") to complex, with both spiral and axial ribbing. Characteristic row of spiral beading just below suture. Aperture nearly rectangular, outer lip reflected inwards. Sinus deep, callus present. Anterior end truncate.

Remarks

"*Crassispira*" *harpularia* has been placed in a variety of genera since it was first described, including *Pleurotoma*, *Crassispira*, *Drillia*, *Melatoma*, and *Splendrillia*. Since Cotton (1947) placed the species in *Splendrillia* it has remained in this genus. However, the radula of "*C. harpularia*" has never been figured and is reported here for the first time. It is very similar to that of *Austrodrillia angasi*, which is also reported for the first time, and very unlike that of the type species of the genus *Splendrillia*, *S. woodsi*. The radulae of both "*C. harpularia*" and *A. angasi* are of the type described for the Crassispirinae by McLean (1971) and both are transferred to this subfamily.

The question of which genus to place "*C. harpularia*" in is more difficult. There are no southern Australian genera currently included in the Crassispirinae. The species is placed in "*Crassispira*" temporarily pending a generic review of the subfamily Crassispirinae.

"*Crassispira*" *harpularia* (Desmoulin, 1842)

Plate 1, Fig. 2. Plate 6, Figs. 5,6.

Pleurotoma harpula Kiener, 1840: 58, 59, pl. 18, fig. 3.

Pleurotoma harpularia Desmoulin, 1842: 162. Reeve, 1843: pl. 15, fig. 124. New name for *P. harpula* Kiener, 1840, not *Murex harpula* Brocchi, 1814 nor *Pleurotoma harpula* Deshayes, 1834).

Crassispira harpula (Kiener). Menke, 1853: 73.

Drillia harpularia (Desmoulins). Angas, 1865: 159. Tate, 1879: 137. Tryon, 1884: 193, pl. 14, f. 99. Sowerby, 1896: 24. Pritchard and Gatliff, 1899: 170. Verco, 1909: 296.

Drillia (Crassispira) harpularia (Desmoulins). H. and A. Adams, 1868: 91.

Pleurotoma (Crassispira) harpularia (Desmoulins). Weinkauff, 1876: 97, pl. 21, f. 2.

Melatoma harpularia (Desmoulins). Hedley, 1922: 251.

Antimelatoma harpularia (Desmoulins). Cotton, 1947: 11. Cotton, 1959: 393. Macpherson and Gabriel, 1962: p. 232.

Splendrillia harpularia (Desmoulins). Powell, 1966: 83. Wells and Bryce, 1986: 120, pl. 40, fig. 467.

Shell

Shell medium, 30 mm, high spired, medium weight. Protoconch globose, smooth, 2 whorls, 0.73 mm high, 0.87 mm wide. Teleoconch with up to 9 whorls. Sutures impressed; pronounced subsutural fold. Approximately 19 pronounced axial ribs/whorl extend from subsutural fold to next suture. Ribs not vertical, bottom offset to left. Progressively smaller on body whorl towards lip. Strong spiral striae on all whorls; becomes only sculpturing on body whorl below ribs. Sinus deep, rounded, with large callus. Outer lip slightly thickened. Anterior siphonal canal broad, shallow. Columella broad, slightly callused, callus at top end. Aperture of moderate width, cylindrical. Shell light to dark brown or orange.

Measurements

	Length (mm)	Width (mm)	Aperture (mm)	W/L	A/L
Mean (n=12)	21.6	7.0	7.5	0.33	0.35
S. D.	3.3	0.8	1.2	0.02	0.02
Range	18.2- 27.7	6.2- 8.6	5.9- 9.7	0.29- 0.35	0.30- 0.37

Radula

Radula (Plate 1, Fig. 2) consists of single long, curved marginal tooth on each side, 150 μ m long and 29 μ m wide. Basal plate absent. Entire lower surface of tooth curved. For first 2/3 of tooth length the upper surface nearly matches lower curvature, before straightening and coming to sharp point. Upper portion has a flat elevated area with complex structure.

Location of type

Not known.

Type locality

Probably King George Sound, W.A. (Hedley, 1922). Fossil records: Limestone Creek, Glenelg River (Werrikooian), S. A., Upper Pliocene (Dennant and Kitson, 1903). Quaternary, S. A. (Ludbrook, 1984). (Specimens not seen.)

Material examined

TAS: Brown R. (AM). VIC: Portland (MV). SA: (5 MV; WAM); Glenelg (AM); Adelaide (2 AM); Semaphore Beach, Adelaide (AM); Gulf St. Vincent (AM, 2 MV); Corny Point, Yorke Peninsula (AM); Hardwicke Bay, Yorke Peninsula (AM); Spencers Gulf (AM, MV); near Red Cliff Point, E side, Upper Spencers Gulf (AM); Port Lincoln (MV); 9m Arno Bay (AM); Smokey Bay, Eyre Peninsula (2AM). WA: (2AM); N Twin Peaks, Recherche Arch. (MV); Sandy Hook I., Recherche Arch. (MV); Mondrain I., Recherche Arch. (WAM); Albany (3AM); Oyster Harbour, Albany (8WAM); Princess Royal Harbour, Albany (AM); Geographe Bay (AM, MV); Dunsborough (AM, WAM); Busselton (2WAM).

Distribution

Victoria and Tasmania to Geographe Bay, W.A. In southwestern Australia the species is found on subtidal sandflats.

Remarks

The AM collection has a single lot from off Sow & Pigs Reef, NSW. However there are no other records of this common species in New South Wales, and the locality is regarded as being incorrect.

Splendrillia harpularia is easily distinguished from all other southern turrids by its relatively large size, pronounced spiral cord just below the suture, prominent axial ribbing, and spiral striae.

***“Crassispira” duplaris* Hedley, 1922**

Plate 6, Figs. 7,8.

Melatoma duplaris Hedley, 1922: 250, 251, pl. 45, fig. 42.

Splendrillia duplaris (Hedley). Cotton, 1947: 11.

Shell

Shell small, 8 mm, solid, high spired. Protoconch small, rounded, glossy, 2 whorls, 0.33 mm high, 0.60 mm wide; teleoconch of 6 whorls. Sutures deeply impressed with a pronounced constriction on the whorl below suture. Strong nodules above constriction are connected by wavy axial striae to strong ribs lower on the end of shell, last rib thickened. Last half of body whorl smooth, without ribs. About 10 fine spiral striae on body whorl below ribs; additional broken striae are found between the lower parts of the axial ribs. Lip thickened, aperture wide, cylindrical, columella narrow, anterior siphonal canal short, broad, but deep. Sinus deep, notch with prominent callus. Shell glossy cream colour, aperture white.

Measurements

	Length (mm)	Width (mm)	Aperture (mm)	W/L	A/L
Holotype	8.2	3.2	2.9	0.39	0.35

Location of type

Holotype, 1 specimen. AM C.15130.

Type locality

9 m. depth, off Horsey River, about 64 km north of the Mitchell R., Gulf of Carpentaria, Qld.

Material examined

Holotype.

Distribution

Known only from the type locality.

Remarks

"*Crassispira*" *duplaris* is closest to "*C.*" *harpularia* but differs in having a heavier, broader shell, a less distinct spiral cord, and broader and less numerous axial ribs. In addition "*C.*" *duplaris* is a tropical species known only from the Gulf of Carpentaria, while *S. harpularia* is a temperate species. "*Crassispira*" *duplaris* is also similar to *S. eburnea*, but the spiral cord of *S. eburnea* is more distinct, the ribs are straighter, and the protoconch larger. In addition *S. eburnea* is a southern species.

No radula of "*C.*" *duplaris* is available for examination, so the subfamily in which the species should be included is uncertain. The shell is conchology most similar to that of "*C.*" *harpularia*, so the species is tentatively transferred to the genus *Crassispira*.

"*Crassispira*" *ansonae* n. sp.

Plate 1, Fig. 3. Plate 7, Figs. 1,2.

Shell

Shell large, 27 mm, high spire, light weight. Protoconch large, rounded, 2.5 whorls, 1.02 mm high, 1.27 mm wide. Up to 9 rounded teleoconch whorls. Suture distinct, nearly straight. About 20 low, indistinct, rounded axial ribs/whorl, curve to right on upper third of whorl then shift to the left lower, forming spiral cord at top. Ribs and cord more distinct on early whorls. Ribs penetrate only slightly down body whorl. Final rib on body whorl enlarged to form low varix. About 30 fine spiral lirae on penultimate whorl, 50 on body whorl. Outer lip thickened, slightly reflected inwards. Aperture elongate oval. Sinus deep, rounded but entrance constricted sharply by outer lip. Small callus. Columella of moderate width, slightly convex. Shell truncate, anterior canal short, broad, not notched. Shell light yellowish white in live collected material, (white in beach collected shells) with line of small brown flecks below suture; and two to three lines of white flecks on spiral lirae; aperture white.

Measurements

	Length (mm)	Width (mm)	Aperture (mm)	W/L	A/L
AM specimens	27.1	8.4	9.5	0.31	0.35
	24.6	7.4	7.7	0.30	0.31

Radula

Radula of marginal teeth only (Plate 1, Fig. 3). Teeth long (240 μm), narrow (30 μm), slightly curving. Basal plate slightly broadened. Slight notch along side into which adjacent tooth fits. Last third of tooth straightens to distinct point.

Operculum

Unknown. One specimen was broken open to obtain the radula, but the operculum was lost. The holotype is believed to contain a preserved animal, but the shell was not broken open.

Holotype

WAM 75-90. 7.5 m depth, bay inside lighthouse, Cape Leeuwin, Augusta, WA.

Paratypes

WA: Cape Leeuwin Lighthouse, Augusta: (AM C.161062), 1 specimen; (WAM 50-90) 3 specimens; (WAM 51-90) 4 specimens; Ringbolt Bay, Augusta (WAM 55-90) 2 specimens; Lighthouse, Augusta: (WAM 69-90) 2 specimens; (WAM 70-90) 2 specimens; Augusta (AM C.161061) 11 specimens.

Range

Known only from Augusta, WA.

Etymology

"*C.*" *ansonae* is named after Mrs. Wendy Anson in recognition of the many interesting specimens she collected in the southwest of Western Australia over a number of years. Much of the type material of "*C.*" *ansonae* was collected by Mrs. Anson.

Remarks

"*C.*" *ansonae* has long been known from very worn beach material collected at Augusta over the years by Mrs. Anson. In February 1990 a trip was made to Augusta to try to collect live material. Several specimens were found in the bay adjacent to the Cape Leeuwin lighthouse at 7.5 m depth, but only two were alive. The bottom in this area is a mixture of basement granite, with some granite boulders interspersed with sandy areas. Macroalgae are abundant. The live "*C.*" *ansonae* were located in small sand patches among the granite rock or in sand under small granite boulders.

"*C.*" *ansonae* has a much smoother shell than either "*C.*" *harpularia* or "*C.*" *duplaris*, lacking the strong spiral striae and with broader, less distinct axial ribs. "*C.*" *ansonae* also resembles two species included here in *Splendrillia*, for which the radula is not known. It resembles *S. spadicina* of eastern Australia, but differs in having a lighter shell with less pronounced ribs and spiral cord and a lighter colour. It does not have as many whorls or as tall a spire as *S. acostata*.

Genus *Austrodrillia* Hedley, 1918

Austrodrillia. Hedley, 1918: M79. Type species *angasi* Crosse (o.d.). Cotton, 1947: 10. Cotton, 1959: 393. Macpherson and Gabriel, 1962: 232. Iredale and McMichael, 1962: 232.

Diagnosis

Shell small, 8-16 mm, high spired, medium to solid, anterior end truncated. Protoconch paucispiral, 2 whorls or less, smooth, rounded. Teleoconch up to 6

whorls. Adult sculpture variable smooth to strong axial ribs or spiral striae. Subsutural fold absent. Sinus deep, U shaped, callused. Outer lip thin, lacks varix but may be reflected inwards. Stromboid notch indistinct. Anterior canal short, moderate to wide, shallow notch. White to brown or reddish. Southeastern Australia; 29-550 m.

Remarks

Austrodrillia angasi is the type species of the genus *Austrodrillia*, which has only been placed in the Clavinae by previous authors. McLean (1971) defined the Clavinae as being the only subfamily with rachiglossate, comblike lateral teeth. As these teeth are absent in *A. angasi*, an alternative subfamilial placement is needed. Several subfamilies can be considered.

The first potential subfamily is the Turrinae, which has a radula with or without a central tooth and with wishbone shaped marginals (McLean, 1971). *A. angasi* fills this criterion, but in the Turrinae the anal sinus is on the peripheral keel, not on the shoulder as it is in the closely related Turriculinae (McLean, 1971). On this basis *A. angasi* is not included in the Turrinae.

The second potential subfamily is the Turriculinae. McLean (1971) characterizes the radula of this subfamily as being with or without a central tooth, and with the laterals wishbone shaped or with the distal limb severed. In addition to fulfilling this also *A. angasi* has the anal sinus on the shoulder. However, the anterior canal of *Austrodrillia* is short compared to most other genera of the Turriculinae, and this subfamily is rejected.

The most obvious potential subfamily is the Crassispirinae, which was removed from the Clavinae by Morrison (1966). This subfamily includes all the nontoxoglossate genera which lack central and marginal teeth (McLean, 1971). However McLean (1971) also characterizes the subfamily on the basis of having a parietal callus, but this is not really a subfamilial character. It is the Crassispirinae into which the genus *Austrodrillia* is placed.

Austrodrillia angasi (Crosse, 1863)

Plate 1, Figs. 4,7. Plate 7, Figs. 3,4.

Pleurotoma angasi Crosse, 1863: 87, pl. 1, fig. 5.

Drillia angasi (Crosse). Angas, 1867: 203. Tryon, 1884: 6. 187, pl. 9, fig. 37. Brazier, 1889: 71. Whitelegge, 1889: 91. Gatliff and Gabriel, 1908: 375.

Austrodrillia angasi (Crosse). Hedley, 1918: M81. Hedley, 1922: 247. Cotton, 1947: 10. Allan, 1950: 192, pl. 22, fig. 5. Laseron, 1954: 16, pl. 3, fig. 59. Iredale and McMichael, 1962: 77. Macpherson and Gabriel, 1962: 232. Powell, 1966: 84.

Shell

Shell small (17 mm), spire very high, medium weight. Protoconch smooth, rounded, 2 whorls, 0.67 mm high, 0.93 mm wide; teleoconch 8 whorls. Suture slightly impressed. Upper 1/4th of whorl flat then broad, flat ribs develop. Highest near top of rib, give whorls convex appearance. 10-12 ribs/whorl, penetrate almost to lower end of body whorl. Numerous fine spiral lines on whorls most pronounced

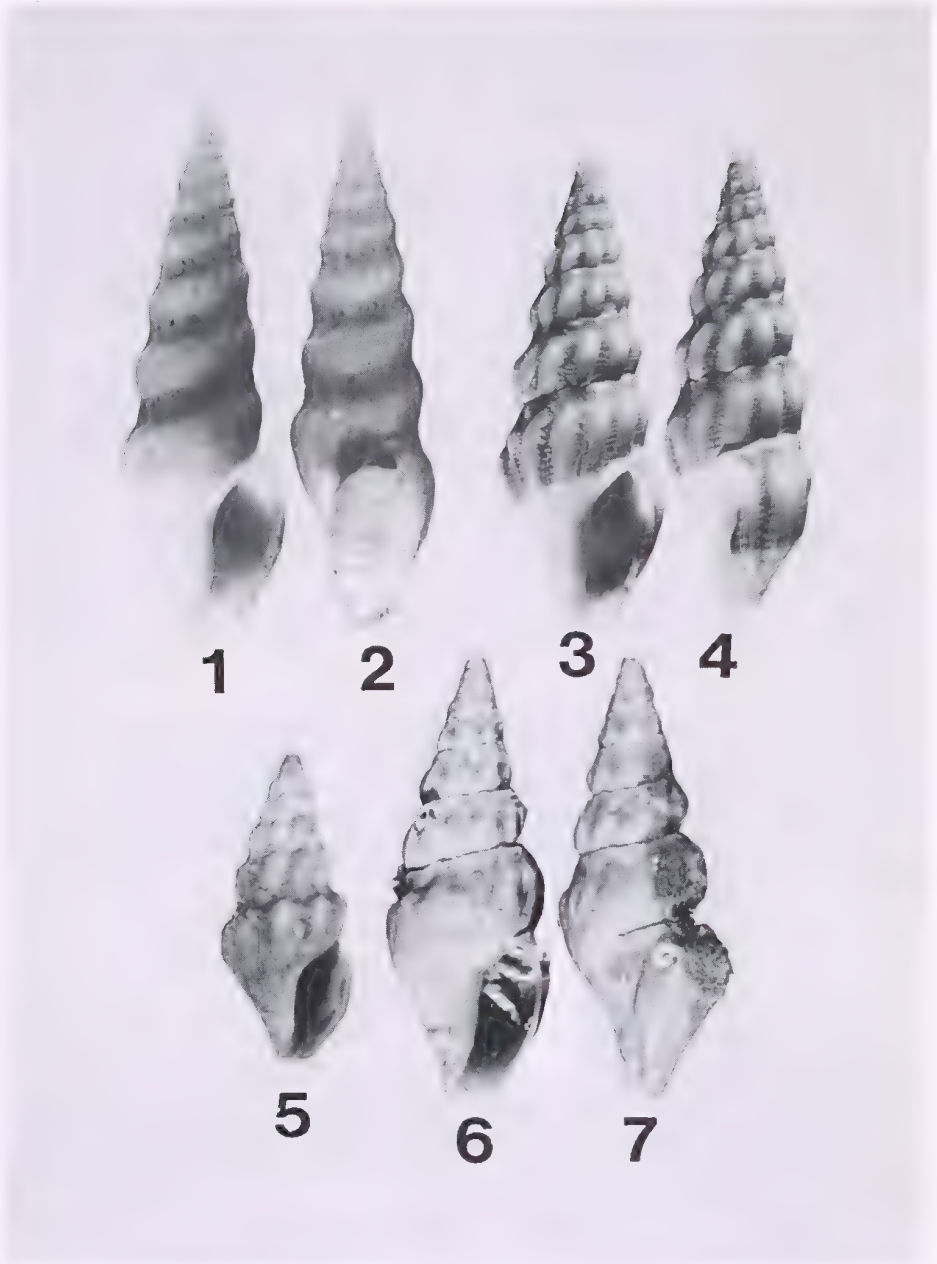


Plate 7. "*Crassispira*". Figs. 1,2. "*Crassispira*" *ansonae* n. sp. Holotype, WAM 75-90. *Austrodrillia*. Figs. 3,4. *Pleurotoma angasi* Crosse, 1863. Syntype, BM(NH) 1870.10.26.55. Fig. 5. *Pleurotoma beiaudiana* Crosse, 1863. Syntype, BM(NH) 1870.10.26.56. Figs. 6,7. *Drillia taeniata* Tenison Woods, 1878 (1879). Holotype, TM E.717/8058.

on lower half of body whorl. Axial growth lines also present. Outer lip thickened. Sinus short, narrow, U shaped, callus adjacent to entrance. Columella narrow, thin. Anterior siphonal canal short, shallow, broad. Aperture subrectangular, wide. Shell light greyish brown, dark brown between ribs, aperture off white at margins, light brown within.

Measurements

	Length (mm)	Width (mm)	Aperture (mm)	W/L	A/L
Syntypes					
Mean (n=7)	12.7	4.5	4.5	0.35	0.36
S. D.	0.6	0.3	0.2	0.02	0.02
Range	11.9-	4.0-	4.3-	0.32-	0.34-
	13.7	4.9	4.9	0.38	0.40

Radula

Radula (Plate 1, Fig. 4) of one marginal tooth on each side; no central tooth and no lateral teeth. Marginals long (125 μm), sloping, fairly narrow teeth (20 μm wide). Base of each tooth, at the lateral sides of the radula on the photograph, broad. Slightly above the base a ridge begins, extends for two thirds of length of tooth. Notch present on outside of tooth at about this point. Final third of tooth comes to a sharp point.

Operculum

Operculum brown, horny, oblongate, 2.1 mm long, 1.1 mm wide, and comes to a sharp point (Plate 1, Fig. 7). Distinct growth lines present.

Location of type

Syntypes, 7 specimens. BM(NH) 70.10.26.55.

Type locality

Port Jackson, NSW.

Material examined

Syntypes. NSW: (4 MV); Minnie Water, S of Clarence River (4 AM); Iluka (AM); Shelly Beach 8 km S of Yamba (AM); Shelly Beach, Angousie (AM); Wooli Beach (AM); Woolgoolga (2 AM); Coffs Harbour (2 AM); 18 m Fly Point, Port Stephens (AM); 15-18 km off Nelson Head, Port Stephens (AM); Catherine Hill Bay, S of Newcastle (AM); Budgewoi Beach (AM); 145 m off Broken Bay (AM); Port Jackson (2 AM; 2 MV); Sydney (WAM): Long Reef (MV); Balmoral, Sydney Harbour (2 AM); Little Fairlight (AM); Middle Harbour, Sydney (AM); Long Bay (MV); Ocean Beach, Kurnell, Botany Bay (AM); Shellharbour (AM); Gerringong, S of Kiama (AM); Wreck Bay, S of Nowra (AM); Huskisson, Jervis Bay (AM); 91 m Montague I. (AM). VIC: Lakes Entrance (MV); San Remo (MV); Philip I. (MV); Cowes (MV); Westernport (2 MV). TAS: Brown's R. (AM).

Distribution

Subtidal to 90 m. New South Wales to Victoria and Tasmania.

Remarks

See remarks under *A. beraudiana*.

Austrodrillia beraudiana (Crosse, 1863)

Plate 1, Fig. 5. Plate 7, Fig. 5-7.

Pleurotoma beraudiana Crosse, 1863: 88, pl. 1, fig. 6. Weinkauff, 1876: 95, pl. 20, fig. 7,8. Tenison Woods, 1877 (1878): 27.

Drillia beraudiana (Crosse). Angas, 1867: 203. Whitelegge, 1889: 91. Pritchard and Gatliff, 1899: 171.

Drillia taeniata Tenison Woods, 1878 (1879): 36. Hardy, 1915: 69.

Austrodrillia beraudiana (Crosse). Hedley, 1918: M81. Hedley, 1922: 248. Cotton, 1947: 10. Allan, 1950: 192. Laseron, 1954: 16, pl. 3, fig. 60. Iredale and McMichael, 1962: 77. Macpherson and Gabriel, 1962: 232. Powell, 1966: 84.

Shell

Shell small, high spire, solid. Protoconch smooth, rounded, 2 whorls, 0.53 mm high, 0.80 mm wide; teleoconch up to 6 whorls. Suture impressed, sinuous. Upper quarter of whorl flat, followed by 8-9 thick, rounded whorls, widest at top. Ribs do not line up on adjacent whorls, taper off towards bottom of body whorl. Sinus small, with small callus at entrance. Columella thin, convex. Anterior siphonal canal short, broad, flat. Aperture elongate. Shell light greyish-brown with white knobs on ribs. Aperture yellowish brown; columella similar.

Measurements

	Length (mm)	Width (mm)	Aperture (mm)	W/L	A/L
<i>beraudiana</i> Syntypes					
Mean (n=7)	14.5	5.8	5.6	0.40	0.37
S. D.	1.3	0.6	0.5	0.01	0.02
Range	11.7- 15.3	4.6- 6.3	4.0- 5.7	0.38- 0.41	0.34- 0.39
<i>taeniata</i>					
holotype	11.7	4.3	4.2	0.37	0.36

Radula

Radula (Plate 1, Fig. 5) of marginal teeth on each side; no central or lateral teeth. Basal plate slightly enlarged. Tooth long (100 μ m), narrow, slightly curving, at maximum width of 15 μ m two-thirds up the tooth. Ridge on upper portion begins just above base, continues to broadest portion of tooth. Last third of tooth comes to a sharp point.

Location of types

(*beraudiana*) Syntypes, 7 specimens. BM(NH) 70.10.26.56. (*taeniata*): Holotype. TM E717/8058.

Type localities

(*beraudiana*) Port Jackson, NSW. (*taeniata*): Flinders I., Tasmania.

Material examined

Types. NSW: (MV); Clarence River (AM); Broughton I., Port Stephens (AM); Nelson Head, Port Stephens (AM); Catherine Hill Bay, S of Newcastle (AM); Port Jackson (5 AM; MV); Sydney (AM; MV; WAM); Little Manly Cove, Sydney (AM); Middle Harbour, Sydney (2 AM); Bottle & Glass Rocks, Sydney (2 AM);

Balmoral, Sydney (AM); 3.5-9 m Balmoral, Middle Harbour, Sydney (AM); Kurnell, Botany Bay (AM); Huskisson, Jervis Bay (AM); Honeymoon Bay, Jervis Bay (AM); Batemans Bay (AM); Broulee (AM); Twofold Bay (AM). VIC: (4 MV); Lakes Entrance (MV); San Remo (MV); Cowes (MV); Western Port (AM; 3 MV); Flinders, Western Port (AM; 3 MV); Balnarring, Western Port (AM), Portsea (MV); Port Fairy (AM). TAS: Circular Head (MV); Brickmakers Beach, near Rocky Cape (AM); Kelso (MV); Tamar Heads (AM); 15 m off Tinder Box, Derwent Estuary (AM); Blackmans Bay (MV); Fisher I. (2 MV).

Distribution

New South Wales to Victoria and Tasmania.

Remarks

Tryon (1884) considered *A. beraudiana* to be a form of *A. angasi*, which he regarded as a variable species. Hedley (1922) concluded that this view is incorrect. There are consistent differences between the two species. *Austrodrillia angasi* has a higher spire, more ribs/whorl (10-12 vs 8-9), dark brown colouration between the ribs, and a smoother appearance. Judging from the localities of museum specimens the two species frequently co-occur.

Hedley (1922) listed *Drillia taeniata* as a synonym of *A. beraudiana*, but with a query. The holotype of *D. taeniata* is a 11.7 mm long specimen with the protoconch missing and 7 teleoconch whorls. The outer shell is eroded, but the aperture is glossy, indicating the animal was recently dead; a hermit crab is inside the shell. The specimen agrees well with all of the characteristics of *A. beraudiana*. I therefore regard it as a synonym.

Austrodrillia agrestis (Verco, 1909)

Plate 8, Figs. 1,2.

Drillia agrestis Verco, 1909: 299, pl. 27, fig. 7.

Austrodrillia agrestis (Verco). Hedley, 1922: 247. Cotton, 1947: 10, pl. 2, unnumbered figure. Cotton, 1959: 393. Powell, 1966: 84.

Shell

Shell small, 10 mm, spire high, medium weight. Protoconch, smooth, 2 rounded whorls, 0.60 mm high, 0.93 mm wide; up to 6 teleoconch whorls. Suture impressed to form slight channel. 11 low, rounded axial ribs on body whorl, faint on last half of body whorl. 6 small spiral channels on penultimate whorl, about 15 on body whorl. Outer lip thickened, sinus rounded, deep, broad. Columella thin. Anterior canal short, broad, aperture broad, almost rectangular. Outer shell creamy white, aperture orange. Radula and operculum unknown.

Measurements

	Length (mm)	Width (mm)	Aperture (mm)	W/L	A/L
Holotype	9.7	3.7	3.5	0.38	0.36
Paratype SAM D.16032	8.1	3.1	3.4	0.38	0.42
Paratype AM C.31078	8.0	3.2	3.3	0.40	0.41
Paratype MV F.30419	8.8	3.3	3.0	0.38	0.34



Plate 8. *Austrodrillia*. Figs. 1,2. *Drillia agrestis* Verco, 1909. Holotype, SAM D.13544. Figs. 3,4. *Drillia dimidiata* Sowerby, 1896. Syntype, BM(NH) 1870.10.26.55. Figs. 5,6. *Drillia achatina* Verco, 1909. Holotype, SAM D.13543. Figs. 7,8. *Austrodrillia subplicata* Verco, 1909. Holotype, SAM D.13546. Figs 9,10. *Drillia saxea* Sowerby, 1896. Syntype, SAM D.13547.

Location of types

Holotype. SAM D.13544. Paratypes: 1 specimen, SAM D.16032; 1 specimen, AM C.31078; 1 specimen, MV F.30419.

Type locality

73 m, off Beachport, SA.

Material examined

Types.

Distribution

Known only from the type locality and records by Verco (1909) of Gulf St. Vincent and Backstairs Passage.

Remarks

A. agrestis is similar to *A. beraudiana* but is smaller (10 mm vs 15 mm), has the same number of teleoconch whorls (up to 6), and more axial ribs (11 versus 8-9). In addition there are distinct spiral channels on *A. agrestis* which are absent on *A. beraudiana*. See also comments under *A. dimidiata*.

***Austrodrillia dimidiata* (Sowerby, 1896)**

Plate 8, Figs. 3-6.

Drillia dimidiata Sowerby, 1896: 24, pl. 13, fig. 2. Verco, 1909. Trans. Roy. Soc. S. Aust. 33: 297.

Drillia achatina (Sowerby). Verco, 1909: 298, 299, pl. 26, fig. 2.

Austrodrillia dimidiata (Sowerby). Hedley, 1922: 248. Cotton, 1947: 10, pl. 1, f. 2. Cotton, 1959: 393. Powell, 1966: 84.

Austrodrillia achatina (Sowerby). Hedley, 1922: 247. Cotton, 1947: 10, pl. 2, unnumbered figure. Powell, 1966: 84.

Shell

Shell small, spire high, medium weight. Protoconch smooth, globose, 2 whorls, 0.60 mm high, 0.93 mm wide; teleoconch of 5 whorls. Suture channeled. 10 broad, low ribs form at about midpoint of upper whorls, give whorl an angular appearance. Body whorl has flat area at top, swollen below, ribs very faint, faint spiral lirae on body whorl. Outer lip thin, stromboid notch small, shallow, but distinct. Sinus a deep notch, U shaped, callus strong. Columella smooth, narrow. Anterior siphonal canal broad, short, shallow, notched. Aperture broad, somewhat rectangular. Shell yellowish-white, aperture similar. Radula and operculum unknown.

Measurements

	Length (mm)	Width (mm)	Aperture (mm)	W/L	A/L
<i>dimidiata</i>					
SAM Syntype	10.7	4.3	4.7	0.40	0.44
BM(NH)Figured syntype	11.0	4.1	4.4	0.37	0.40
BM(NH) syntype	7.1	2.8	2.6	0.40	0.37

	Length (mm)	Width (mm)	Aperture (mm)	W/L	A/L
<i>achatina</i>					
Holotype	7.9	2.9	2.9	0.37	0.37
Paratype AM C.31077	8.1	3.1	3.2	0.38	0.40
Mean (n=6)	4.7	1.9	1.9	0.42	0.33
S. D.	1.7	0.6	0.7	0.04	0.01
Range	3.3-	1.4-	1.4-	0.36-	0.36-
	8.1	3.1	3.2	0.46	0.44

Location of types

(*dimidiata*) Syntype, 1 specimen each. SAM D.31545. BM(NH) 1896.7.15.1. BM(NH) 1896.7.15.5. (*achatina*) Holotype. SAM D.13543. Paratypes, 3 specimens. SAM D.15917. 1 specimen. AM C.31077.

Type localities

(*dimidiata*) 29-33 m depth, Backstairs Passage, SA. (*achatina*): 37 m, off Newland Head, SA.

Material examined

Types. SA: 73 m, Beachport (AM); 183 m, 64 km S of Cape Wiles (AM).

Distribution

Known only from 29-183 m depth off South Australia.

Remarks

The type of *A. achatina* is more colourful than the syntypes of *A. dimidiata*, but this is attributed to the shell being in better condition. Apart from the larger size of some of the specimens of *A. dimidiata*, there is no significant difference in structure of the two forms. The specimens all come from the same geographic area and depth ranges, and I conclude that a single species is represented.

Verco (1909: 299) in describing *A. achatina* compared it with *A. agrestis*, stating that *A. agrestis* "may possibly be a rude costate variant". The only feature separating *A. agrestis* is the low, rounded ribs. When additional material becomes available it will be possible to show whether the ribs of *A. agrestis* intergrade into the lack of ribs on *A. achatina*. Until additional material becomes available it still seems preferable to be conservative and retain *A. agrestis* as a separate species.

Austrodrillia subplicata Verco, 1909

Plate 8, Figs. 7,8.

Austrodrillia subplicata Verco, 1909: 300, pl. 27, fig. 6. Cotton, 1947: 10, pl. 2, f. 11.

Cotton, 1959: 393. Powell, 1966: 84.

Shell

Shell small, spire high, 7 mm, light weight. Protoconch smooth, slightly convex, 2 whorls, rounded, 0.47 mm high, 0.67 mm wide; teleoconch of 4 whorls, rounded, convex, with slight constrictions noticeable near middle of upper whorls. Surface smooth, except for very low ribs and faint growth lines. Lip thickened. Sinus

shallow, slight thickening instead of callus. Columella slightly convex, anterior siphonal canal short, broad, shallow. Aperture broad, oval. Shell light brown with slightly darker brown line at suture; three lines on body whorl; aperture white. Radula and operculum unknown.

Measurements

	Length (mm)	Width (mm)	Aperture (mm)	W/L	A/L
Holotype	7.1	2.9	3.0	0.41	0.42

Location of type

Holotype. SAM D.13546.

Type locality

73 m depth, off Beachport, SA.

Material examined

Holotype. SA: 274 m off Beachport (AM).

Distribution

Known only from 73-274 m depth off South Australia.

Remarks

Austrodrillia subplicata is similar in shape and size to the *dimidiata-agrestis* complex, and they occur in the same geographical area and depth range. *Austrodrillia subplicata* can be differentiated by its smaller length, lack of sculpture and relatively few whorls.

Austrodrillia saxea (Sowerby, 1896)

Plate 8, Figs. 9,10.

Drillia saxea Sowerby, 1896: 25, pl. 3, fig. 4. Verco, 1909: 304. May, 1910 (1911): 308. Gatliff and Gabriel, 1913: 74.

Austrodrillia saxea (Sowerby). Hedley, 1922: 249. Cotton, 1947: 10, pl. 1, fig. 4. Cotton, 1959: 393. Macpherson and Gabriel, 1962: 232. Powell, 1966: 84.

Shell

Shell small, light, high spire. Protoconch a smooth, rounded dome of 2 whorls, 0.33 mm high, 0.60 mm wide; 5 additional shell whorls. Suture impressed, wavy. Whorls convex with 9 rounded, slightly undulating, axial ribs/whorl. Faint growth lines crossed by numerous spiral striae: about 18 on penultimate whorl and about 40 on body whorl. Outer lip thickened by final rib. Sinus short broad, points upwards, slight callus on left side. Columella thin, slightly convex. Anterior siphonal canal very short, broad. Aperture elongate, subrectangular. Body whorl decreases sharply in width towards anterior. Colour uniform creamy white. Radula and operculum unknown.

Measurements

	Length (mm)	Width (mm)	Aperture (mm)	W/L	A/L
Syntype BMNH 1896.7.15.5	7.1	2.8	2.6	0.39	0.37
Syntype SAM D.13547	7.0	2.7	2.6	0.38	0.37
Syntype AM C.25994	6.2	2.6	2.4	0.42	0.39
Other specimens					
Mean (n=9)	5.9	2.4	2.2	0.40	0.37
S. D.	0.5	0.4	0.2	0.04	0.02
Range	5.3- 6.8	2.0- 3.2	2.0- 2.4	0.34- 0.47	0.34- 0.41

Location of types

Syntype, 1 specimen. BM(NH) 1986.7.15.5. Syntypes: 1 specimen. SAM D.13547. 26 specimens. SAM D.15918. 1 specimen. AM C.25992.

Type locality

St. Vincent Gulf, SA.

Material examined

NSW: Disaster Bay (MV); VIC: Wilsons Promontory (MV); TAS: Stanley (MV); 183 m Cape Pillar (2 AM); SA: off Beachport (MV); 201 m off Beachport (AM); 73 m off Beachport (AM); 101 m off Cape Borda (AM); 73 m off Cape Borda (AM); 183 m, 64 km S of Cape Wiles (AM; WAM).

Distribution

73 to 549 m (Verco, 1909). New South Wales to South Australia and Tasmania.

Remarks

Verco (1909) records live collected specimens as having a spiral row of brown spots just below the suture, between the ribs, and three faint spiral brown bands and very faint curved axial bands on the body whorl. These characteristics, visible on dead collected shells, distinguish the species easily from other *Austrodrillia*.

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